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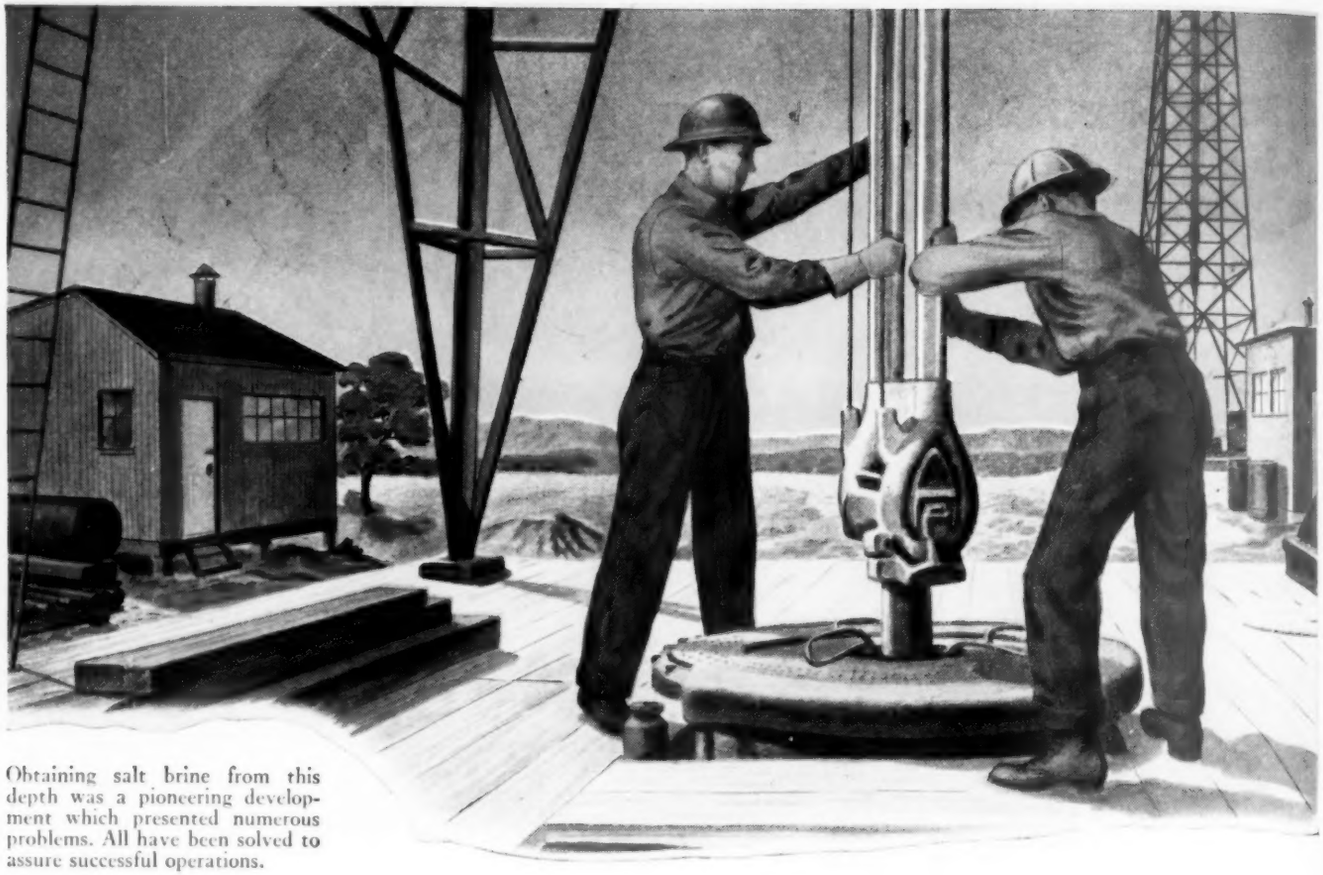

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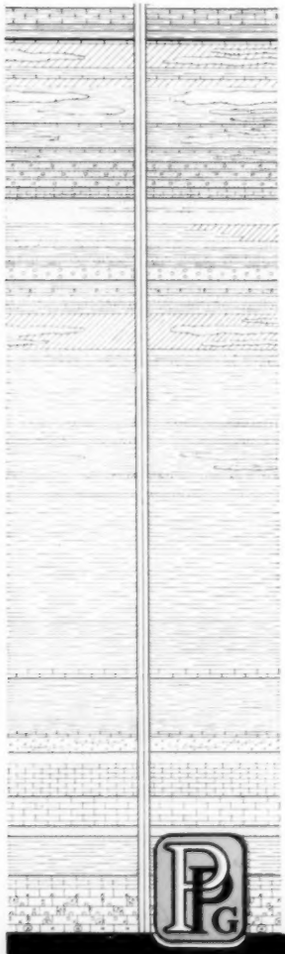

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Chemical Corps Journal

OFFICIAL PUBLICATION OF THE CHEMICAL CORPS ASSOCIATION
Room 206, Burton Bldg., 928 5th St. N.W.
Washington 1, D. C.
Lt. Col. HAROLD B. RODIER, *CmlC, Ret.*, Editor

Vol. II | JANUARY, 1948 | No. 3

THE PICTURE ON THE COVER

General Omar Bradley, recently designated Chief of Staff to succeed General Eisenhower, will be the principal speaker at the Industry-Army Day program to be held at Dallas, Texas, on January 23. See story on page 5.

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INDEX TO ADVERTISERS

". . . to sponsor new developments designed to increase the efficiency of chemical warfare means, to collect and disseminate useful knowledge with respect to chemical warfare and related subjects, to foster a spirit of good will and cooperative endeavor among its members and with industry, and to perpetuate the friendships, memories and traditions growing out of their service with the Chemical Corps . . ."

The Chemical Corps Association

COL. LUDLOW KING, *President*
Washington, D. C.

CAPT. JOSEPH SCHWIMER, *Cml. Res., Sec'y-Treasurer*
Room 206, 928 Fifth Street N.W.
Washington 1, D. C.

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Vol. II **JANUARY, 1948** **No. 3**

TECHNICAL UNITS FOR NATIONAL GUARD

While *The Chemical Corps Journal* is not able to speak with authority of the mobilization planning of the Army, it is reasonably clear that our military authorities have placed the greatest emphasis, in such planning, upon the National Guard. With its greatly increased strength it is obvious that the Guard can "get there fustest with the mostest" in troops which are organized, officered, equipped, measurably trained and coordinated with other military units. Of the non-regular components of our defense forces, the National Guard can place the maximum number of effective troops in the field in the minimum length of time.

Accepting the above as a reasonably well established premise, we advance another assumed premise. It is that any new war emergency that may be anticipated is quite likely to arise with a sudden enemy attack using new, strange and terrible weapons.

From these two premises we assume a third one. It is that there should be components in the National Guard of specialized technical troops, specifically trained and equipped to carry out such missions as are implied in meeting any such attacks or sudden emergencies. The particular field of our interest naturally lies in the chemical missions of such technical troops. The type of units which occur most obviously to us are such organizations as laboratory units, decontaminating and impregnating units, smoke generator companies, and biological warfare units about whose specific missions it is not necessary even to speculate.

We have little doubt that such technical components for the National Guard have been fully envisualized and planned in detail. But in point of fact, no such units have been activated and no information is available suggesting that their organization has been projected. Six chemical mortar battalions have been authorized (though not yet activated), but these are not the type of chemical organizations which are here discussed.

We therefore strongly urge that immediate steps be taken to implement our national defense with suitable specialized, technical components for the National Guard without further delay so that such units may be recruited, equipped and trained to meet any sudden emergency calling for special defensive and counter-offensive measures. It is suggested that the need for such units is clearly self-evident as a part of our National Guard.

If such organizations are authorized for activation there is no doubt but that the Chemical Corps Association can be of material assistance in securing trained personnel for them. Our Association includes in its membership and the contacts of its members a wealth of highly trained men suitable for such organizations, and it is believed that adequate numbers of such men would welcome an opportunity for assuming the duties and responsibilities implied by such missions.

Finally, we express our conviction that the time for action is *now*. "If 'twere well 'twere done, 'twere well 'twere done quickly."

FRED M. JACOBS TAKES OVER ASSOCIATION OFFICE

Mr. Fred M. Jacobs, during the war years Executive of the Management Office, Office of the Chief, has entered upon his duties, acting as Secretary and Treasurer of the Chemical Corps Association. Joe Schwimer is devoting his full time as advertising manager of *The Chemical Corps Journal* and has established his headquarters in New York City.

The expanded activities of the Association made it necessary to arrange for full-time advertising management as well as a full-time secretary-treasurer. Mr. Jacobs will devote much

(Continued on page 59)

From Your National President

EXIT GAS WARFARE?

"Gas warfare is obsolete! Yes, like the cavalry and horsedrawn artillery, it is outmoded, archaic, and of historical interest only. This is the atomic age! Neither we nor the enemy employed gas during World War II. This alone proves it antiquated, for the Germans and Japanese resorted to every effective, ruthless, and inhuman type of warfare in their futile effort to conquer." Those are exact remarks made to me less than a week ago. Are they indicative of how woefully uninformed a large percentage of Americans are today?

The Germans first introduced the use of toxic gases against our Allies near Ypres, Belgium, on April 22, 1915. The casualties inflicted were so great that even the Germans underestimated the catastrophic blow they had dealt and failed to exploit the sizeable advantage they had gained.

Comparatively inexpensive chlorine gas, released from cylinders, was blown into the American lines, spreading death, fear and pandemonium throughout our entire front. The methods of "packaging" and "delivering" gases, however, were so embryonic that the Allies had time to rally. They developed masks which would provide protection against those gases being used and also learned to produce and employ the same weapons against the Germans. Gas was the "atomic bomb" of World War I, but time permitted us to equalize and exceed the advantages the Germans gained by resorting to it.

The Germans and the Japanese refrained from using deadly gases in World War II for one reason only. Serving as Corps Chemical Officer of the VII Corps, I spent many hours evaluating the capabilities and probabilities of encountering gas during our planned invasion of Normandy. There were only a few narrow causeways over which our troops could transcend the wide inundated area behind the large concrete sea wall on Utah Beach. Had the Germans mined those with liquid gas and spread a film of liquid gas over the surface of the inundating water, our casualties would probably have been a thousandfold greater than were actually experienced. By necessity, we made all possible preparations for meeting gas, though circumstances indicated it would not be used by our enemy. There were battles which the enemy could have won if it had dared resort to the use of gas. But it didn't dare . . . and there rests your answer. Their fear of overwhelming retaliation and our policy not to introduce gas warfare prevented its employment during World War II. Our enemies had learned that our tremendous war supply of powerful casualty gases far exceeded their own, and our facilities for "packaging" and "delivering" excelled those available to them. They had too little to gain and too much to lose. I am thoroughly convinced that our preparedness through the Chemical Warfare Service saved our troops and perhaps our cities from the devastating effects of gas warfare. Though this preparedness cost our nation a considerable amount of money, it was far better than paying for unpreparedness with great losses of lives and battles.

Still, some people believe gas warfare is superannuated. That is far from the truth! Warfare gases are tremendously powerful and effective weapons. From a very objective and realistic point of view, they are perhaps the most inexpensive casualty producer presently known. The cost of the two atomic bombs dropped on Japan could procure sufficient toxic gas to bring complete devastation to the populaces of a thousand cities the size of Hiroshima. Since the goals of war involve killing, why not employ economical weapons? The enemy most certainly will, and if we are not prepared for taking preventative measures and delivering counterattacks, we shall be in great jeopardy.

Fully aware that atomic bombs will be used in the next war, the world no longer cringes at the thought of gas warfare. It realizes that any and all methods of destruction will be used and that the country having the greatest quantity of powerful weapons will be the victor. Since the United States possesses the greatest chemical industry in the world today, it would be foolhardy to neglect making use of this favorable asset. We will be forced to use all resources and available weapons if and when our country is again forced into another conflict.

It is doubtful whether any nation will ever have the majority of its civilians equipped with gas masks at the outbreak of a war. Then, too, masks may be designed for several gases but the filter would fail to stop the lethal poison

(Continued on page 59)

General Waitt Addresses Symposium

Maj. Gen. Alden H. Waitt, Chief, Chemical Corps, presented an address of welcome at the opening of the Symposium on Military Physiology held at the Army Medical Center, Washington, D. C., on 4, 5 and 6 December 1947. The symposium constituted the regional meeting of the American Physiological Society.

General Waitt stated that the program of the symposium illustrates two principles now firmly established in the Chemical Corps: *Competent scientists are wedded to fundamental research, and fundamental research is vital to the success of a research and development organization.*

"The relation of the medical sciences to the program of the Chemical Corps underwent a tremendous transition during the war," said the General, "due to the effective and harmonious working arrangements made between the Chemical Corps and the Medical Department."

Returning to the principle that scientists are wedded to research, General Waitt said, "I want to tell you in a few words how this works in the Chemical Corps and define my own views. I believe in the great importance of research and its high place in the national defense system. When I say research, I include in high priority basic research, research that cannot meet a deadline, research that may not show any immediate return. I believe that within the framework of the military organization a strong and productive program can flourish. I believe that having stated the objectives to be attained, the military must permit the scientist to carry out a program without interference . . . Our scientists of Ph.D. caliber are encouraged to undertake original independent research within the broad field of Chemical Corps responsibilities. They are not placed under the onus of producing within six months or a year applicable results from such research. It is assumed that this policy will bear fruit in the form of fundamental discoveries of great importance to science; it is hoped and believed that some of these discoveries eventually can be applied by our engineers. In any case, it is certain that these scientists will grow in stature and will be strengthened in their loyalty to the Chemical Corps by this policy."

The General continued, "In return for the opportunity to conduct original and virtually untrammeled research, our scientists agree to bend their shoulder to the wheel and carry out directed investigations of immediate urgency, the nature and outcome of which frequently preclude publication."

In conclusion, General Waitt's remarks were: "To my mind, this symposium indicates that the close working relation between scientists in the service of their country, so firmly established during the war, will endure through these years of tumultuous peace."

CIVILIAN AWARD

By LT. MARY B. WARNER, *CmlC*

The Certificate of Appreciation was presented to Mr. John E. McKirdy during an informal luncheon held on 22 October 1947 at the Hotel Pittsburgher. The Certificate, presented by Major Frederick J. Hurley, Commanding Officer, Chicago Chemical Procurement District, was in recognition for an outstanding and inspiring record of performance by Mr. McKirdy as Assistant District Chief, Pittsburgh Chemical Procurement District, and member of the Chemical Corps National Advisory Board. His close liaison with state and local officials, in addition to his personal and energetic efforts and sacrifices in the interest of the national war effort, resulted in the smooth expediting and efficient execution of Chemical Corps missions requiring coordination with state and inter-state agencies. The wide scope of his activities in the interest of the Chemical Corps is worthy of high praise and commendation.

The following friends of Mr. McKirdy were present at the luncheon:

Hon. H. H. Rowan, President, Allegheny County Court of Common Pleas; Hon. Frank P. Patterson, Judge, Allegheny County Court of Common Pleas; Hon. John J. Kennedy, Judge, Allegheny County Court of Common Pleas; Hon. A. M. Thompson, Judge, Allegheny County Court of Common Pleas; Col. John H. Shenkel, Clerk of Courts, Allegheny County; Col. George E. A. Fairley, Director, Pittsburgh Public Safety; Col. Thomas Fitzgerald, Vice-President, Pittsburgh Railways Co.; Robert J. Weber, Vice-President, Westinghouse Electric Corp.; A. E. Brice, Manager, Gulf Oil Corp.; William G. Dick, Manager, Eureka Casualty Co.; James Brown, Manager, Pittsburgh Plate Glass Co.; Stanley Ashe, Warden, Western Pennsylvania Penitentiary; Nicholas Christopher, Vice-President, Meadow Gold Dairies Co.; Robert W. Semenow, Attorney at Law; Charles C. Campbell, Owner, Campbell Pharmacy Co.; Joseph F. Duddy, Manager, Pittsburgher Hotel; William J. Hatton, President Index Publishing Co.; A. E. La Poe, Manager Westinghouse Electric Corp.; P. J. O'Malley prominent political leader.

General Bradley to Address Second National Industry-Army Day

The first National Industry-Army Day was conceived and sponsored by the Coordinating Committee of Military Associations in Washington, D. C. Over fifteen hundred industrialists and affiliates attended this meeting in Chicago, January 17, 1947, where they were intrigued with the "straight from the shoulder" talks delivered by Chief of Staff General Dwight Eisenhower, Lt. General J. Lawton Collins, Major General Willard S. Paul and Major General Henry S. Aurand. The guests and the War Department alike were deeply impressed with the splendid constructive accomplishments, so the success of the meeting quickly spread to all sections of our country. Requests for similar meetings at other localities were soon forthcoming with the result that Regional Industry-Army meetings were arranged for Ft. Lewis, California, and Omaha, Nebraska. General Mark Clark topped the speakers list at the former and General Jacob Devers the latter. These, too, though smaller, were considered outstanding successes.

The Coordinating Committee of Military Associations, with full cooperation of the War Department, is now sponsoring the Second National Industry-Army Day which will be held in Dallas, Texas, on January 23, 1948. All arrangements are being handled by the following committee:

Harry S. Zane, Jr.	Chairman
Rex V. Lentz	Air Force Ass'n
William E. Lind	Army Ordnance Ass'n
H. L. Reynolds	Army Signal Ass'n
F. B. Griffin	Army Transportation Ass'n
Dr. W. Lee Hart	Ass'n of Military Surgeons
Roy A. Lamb	Chemical Corps Ass'n
D. G. Bell	Coast Artillery Journal
H. C. Chappell	Infantry Journal
Lt. Col. F. F. Kriwanek	Quartermaster Ass'n
Col. Henry Hutchings, Jr.	Soc. Amer. Mil. Egrs.

Major J. V. Galloway has been assigned to duty in Dallas by the Fourth Army Headquarters to assist the committee in every way possible, and particularly in matters of publicity.

Individual Association luncheons have been planned by the following:

Chemical Corps Ass'n	Adolphus Hotel
Air Force Ass'n	Baker Hotel
Army Signal Ass'n	Adolphus Hotel
Army Ordnance Ass'n	Baker Hotel
Soc. American Mil. Engrs.	Adolphus Hotel
Quartermaster Ass'n	Fort Worth Depot

The chiefs of the appropriate services will no doubt attend and address the guests of these luncheons. The luncheons are entirely in the hands of the individual associations and not a part of the activities under the supervision of the General Committee.

The afternoon "off the record" conference will be held from 2 P.M. to 4:30 P.M. in the Peacock Terrace of the Baker Hotel which will accommodate approximately 1,500 persons. Talks will be delivered by the following personnel:

General T. T. Handy, Commanding General of the Fourth Army

Mr. Thomas J. Hargrave, Director of the Munition Board

Lt. General R. S. McLain or Major General Floyd L. Parks of the War Department Public Relations Office

Major General Emmett O'Donnell, Jr., Air Force Department

General J. Lawton Collins, Deputy Chief of Staff

A cocktail party will be held from 6 P.M. to 6:45 P.M. in the Peacock Terrace for all persons holding dinner tickets.

General Omar Bradley, recently announced to be the new Chief of Staff, will be the principal speaker at the dinner to be held in the Crystal Ballroom of the Baker Hotel, starting at 7:00 P.M. This will perhaps be his first speech on military subjects after the announcement of his appointment by President Truman.

Short talks will also be made by a representative of Industry and the Governor of Texas or the Mayor of Dallas.

The Dallas Committee assures the C.C.M.A. that although the largest dining room restricts them to a total of 900 guests, the Second National Industry-Day will more than make up for quantity by unsurpassable quality.

Work of the CC Medical Division

By COL. JOHN R. WOOD, *M.C.*

Chief, Medical Division, Army Chemical Center, Maryland

COLONEL JOHN R. WOOD, M. C.

The title, "*Medical* Division," is in some respects misleading, for the responsibilities of Medical Division encompass many fields of investigation, some of which are certainly not *medical*, in the ordinarily accepted meaning of the term. In the past, this title has given to some the impression that the work of this Division was quite separate and apart from the remainder of the research and development program of the Chemical Corps. I am happy to say that this notion has now largely disappeared.

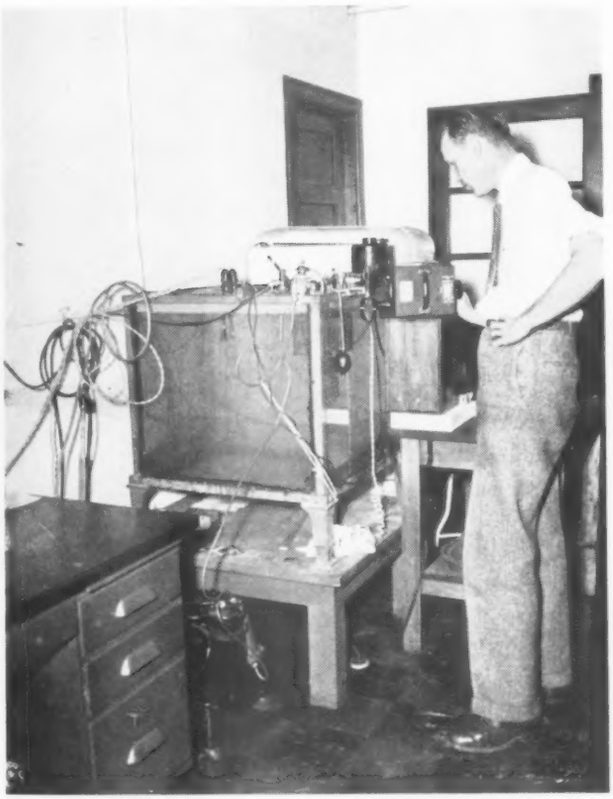
It will be clear to you from the discussion which follows that Medical Division could not possibly carry out its program without substantial assistance from the Technical Command and the other technical agencies of the Chemical Corps. It will be equally clear that a large part of the program of Medical Division is concerned with cooperative work in support of the projects of other technical organizations of the Chemical Corps, and even of some agencies outside of the Chemical Corps. Medical Division is now actively collaborating on some 50 projects of the Technical Command. It is difficult to pick any one of our own projects in which we do not lean to some extent upon another technical agency of the Chemical Corps for assistance.

The pressing days of war, which made close collaboration at times difficult or impossible, have passed. I think that it is now axiomatic that Medical Division and the other technical agencies of the Chemical Corps must be looked upon as coordinated parts of General Waitt's overall research and development machine; that all parts must operate together to the achievement of common goals; that no one part can effectively operate wholly independently of the others.

A few concrete examples will serve not only to illustrate the types of work Medical Division performs but to point out the interdependence of Chemical Corps research and development agencies. Consider one of the important projects of the chemists of the Technical Command. These men are alert for leads to new and more potent chemical agents. They follow these leads by synthesizing a great many new types of chemicals and related compounds. But in the present state of our knowledge, the chemist has no way of knowing whether his new compound is more toxic, or less toxic, than others already available. Nor can he predict with assurance what sort of physiological effects the new compound will produce—whether its action is fast or slow, whether it injures the eyes or blisters the skin, whether it penetrates the skin, or injures the lungs, or acts as a systematic poison. It becomes one of the principal duties of the toxicologists of Medical Division to evaluate these new compounds, and to furnish to the chemist the information he requires. This information not only determines whether further study should be made of this particular compound, but it furnishes the chemist additional leads, upon which he can base his further research. Each of these scientists—the chemist and the toxicologist—is invaluable in his own field, but to fulfill his mission for the Chemical Corps, neither can be fully effective without the help of the other.

Consider the field of protective equipment. It is the responsibility of the engineers and technologists of the Technical Command to design and produce models of equipment to protect our troops against all forms of toxic warfare. Most

of this materiel must be worn by men as individual items of equipment. Before the engineers and technologists can begin their work, some of the basic physiological data concerned in their problem must be available to them, to guide their initial designs. As development proceeds, the models must be tested under a variety of conditions of temperature and humidity, and at various levels of exercise, using man as the test subject.



AN ENTOMOLOGY LABORATORY—Wing beats of an insect flying at constant temperature are timed by stroboscopic light. Wing rate measures the potency of a new insecticide.

The results of these tests guide the final development. Before an item can be standardized, it is essential to know three things about it. First, that it is acceptable and tolerable to the soldier—in other words, that he can wear the device. Second, that it does not interfere to an undesirable degree with the performance of his duties as a combat soldier. And third, that the device does in fact provide the required degree of protection. An important part of the work of Medical Division is concerned with such physiological problems in coliaboration with Technical Command.

This is equally true in dealing with the problems of offensive materiel. The final experimental evaluation of any new agent, munition, or weapon is made by field trials, simulating as nearly as possible the actual combat use of the item. In toxic warfare, the most critical point in the evaluation of an item is its toxic effects upon enemy troops. Where possible, in field trials, enemy troops are represented by human test subjects, but many of these tests are so hazardous that, more often than not, animal test subjects must be used. Conclusions are drawn from both chemical sampling and the biological results, the latter based upon a study of the human and animal test subjects. Even the chemical sampling results are finally interpreted in terms of toxicity data, previously ascertained in the laboratory. It is a function of Medical Division to plan, execute and interpret the physiological phases of these field trials, in close collaboration with the other technical agencies concerned. The choice of offensive materiel, the development of munitions expenditure tables, and the formulation of tactical doctrine concerning its use, is heavily based upon the toxicological results and interpretations of these field trials. Hence it is readily understood that this is one of Medical Division's most important jobs.

So far I have said little that concerns medical problems, in the strict sense. We do have *medical* problems, too. The research and development phases of these problems have been delegated to the Chemical Corps by approved agreement between the Chief of Chemical Corps and The Surgeon General. The Medical Division has therefore been set up as a unit of the Chemical Corps, separated from the Medical Department except for a technical liaison channel.

The only logical approach to the development of effective treatment for chemical injury or poisoning is to first determine precisely what the toxic agent does to man or animal. These mechanisms of action studies are technically difficult, detailed and laborious and consume a major share of the time of our most highly skilled scientists and technicians. The studies involve many fields and techniques. They require the services of physiologists, biochemists, toxicologists, chemists, physicists, pharmacologists, pathologists, and specialists in several branches of clinical and veterinary medicine. Because these investigations are so laborious, we must necessarily confine our efforts to the most important agents and techniques, and leave untouched much that would otherwise be of scientific interest.

Our leads for the development of first aid and treatment come almost entirely from these studies. Without the knowledge they provide, we could only flounder in the dark and guess at what treatment should be tried. It does not necessarily follow that even a fairly complete knowledge of the mechanisms of action of a toxic

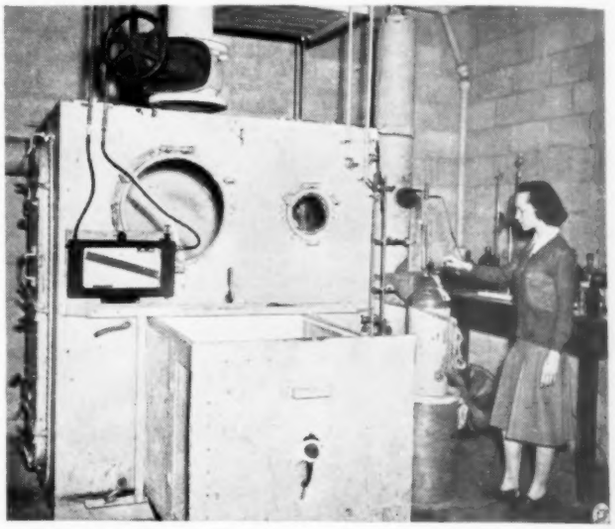
agent will lead at once to successful treatment. However, it is significant that, in general, successful treatment has been developed only for poisoning by those agents for which the vital mechanisms of toxic action have been determined. These studies of treatment are likewise expensive, arduous and time-consuming, though often not as technically difficult as mechanism studies. Hence here again we must confine our efforts to the most important toxic agents and leave untouched many which we would like to study.

I should state at this point that the discoveries in chemical warfare research which have led to recent advances in military and civilian medicine have practically all come from such investigations—the studies of mechanism and treatment.

Medical Division also has responsibility for the sanitary aspects of chemical warfare. We must develop equipment to detect toxics in food and water, to insure troops against poisoning by consuming contaminated food and water supplies. An equally important phase of this work is the assessment of the hazards to food and water presented by the various chemical agents, and the development of full scale practical methods of decontamination or purification, using as far as practicable standard Army, Navy and Marine Corps field equipment. At times our duties have gone a bit beyond this. I recall our collaborative work with the Corps of Engineers at Fort Belvoir in working out the purification of contaminated water supplies in fixed large scale water plants—also that some of our staff went out to California to train the 5th Marine Division in purifying contaminated water by means of the Marine Corps vapor compression still, shortly before their hop-off for the Southwest Pacific.

An intensive study of flame attack with portable and tank-mounted flame-throwers occupied much of our time and personnel during the latter part of the war. These investigations have given us rather clear ideas of just what happens in fortifications attacked by flame—of just what factors kill or disable personnel in the fortifications—and how best to produce these lethal conditions. The 9 final reports summarizing all of this work are now being edited and will soon be published. Close collaborative work with the Technical Command on these projects served to assist them in selecting and improving fuels and flame weapons, and in developing the proper tactical doctrine for flame attack.

As part of the flame warfare studies, Medical Division is conducting an active investigation of severe thermal burns caused by direct flame. These investigations include a study of the physiological mechanisms of flame burns and methods of treatment to save life. Studies of the shock phases have been completed and we



A TOXICOLOGY LABORATORY—Typical gas chamber for studying new chemical warfare agents.

are now investigating the usually fatal late toxic phases, about which very little is known.

A new field of investigation for Medical Division is the study of wound ballistics, which is being undertaken at the joint request of the Ordnance and Medical Departments. This is a study of the relationship between the physical properties of missiles of all kinds—such as bullets, shell splinters and bomb fragments—and the types and severity of wounds they inflict. It is hoped that this work may eventually define a lethal fragment and an incapacitating fragment for the various anatomical regions of the body in terms of physical properties of the missile. This in turn will guide ordnance development toward munitions which will produce a maximum of such fragments, and will predict for the Medical Department the types and statistical frequency of wounds to be anticipated from new ordnance developments. It is inevitable that body armor will come into this picture, and both the Air Forces and Ground Forces have already requested that the evaluation of body armor be included. It is not planned at this time to include studies of blast injury or wound healing.

An account of our part in the national cancer research program was published in the January 1947 issue of the *Chemical Corps Journal*, so I shall not repeat the account here. I wish merely to add that, since that time, a large grant-in-aid for cancer research has been made to Johns Hopkins University by the American Cancer

Foundation. Plans are now completed for the greater part of this work to be done by the Johns Hopkins staff in our Medical Division laboratories at Edgewood. For all practical purposes, this Hopkins group and our group working on cancer research will be welded into one for a common

A PHYSIOLOGY LABORATORY—Blood oxygen is determined by a photo-electric instrument attached to the ear.

research program. I am sure that this will be of mutual benefit to both groups.

Our programs of research on insecticides, miticides, insect repellents and rodenticides are coordinated not only with research and development agencies of the Chemical Corps but, through the Army Committee on Insect and Rodent Control, with all Technical Services of the War Department, and through the Inter-Departmental Committee on Insect and Rodent Control with all other government departments doing research work in these fields. Our own work covers insect physiology, the evaluation of chemicals for the control of insects and rodents, the rearing of standard test insects, and much field testing of developmental items, including clothing impregnated with miticides and repellents.

In the field of fungicides we collaborate with the Technical Command in the testing of many hundreds of new chemicals and impregnated materials in the prevention of rotting by molds and mildews, and with other War Department Agencies through the Prevention of Deterioration Committee.

In the field of bacteriology we are working with the Technical Command and Chemical Corps Board on the development of a better gas mask disinfectant, and with Medical Department in testing aerosols of antibiotics for treating respiratory infections.

We plan to begin studies during the coming fiscal year of the effects of environmental factors, particularly extreme cold, on the use of chemical warfare equipment. This will be closely coordinated with the programs of the Technical Command.

Our work with Technical Command on the development of animal protective equipment, and on the development of first aid and treatment for chemical injuries of military animals, is similar to the work for humans, except that the objects of our devotion are the army mule, the horse, war dog and messenger pigeon.

The equipment developments by Medical Division concern the production of full scale working models of such items as field first aid kits and treatment sets for gas casualties, veterinary kits and sets for the same purpose, detector kits for poisons in water and food, oxygen therapy machines and oxygen distribution systems, oxygen masks and devices to administer oxygen under pressure, protective ointments, anti-flash burn ointments, and a variety of pharmaceuticals for treating chemical injuries and burns.

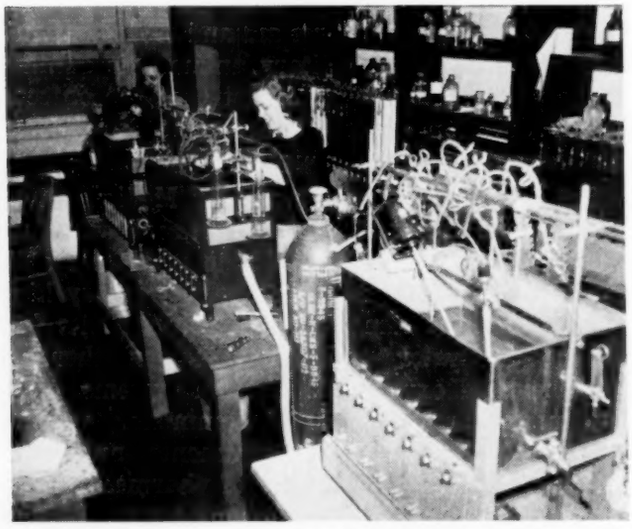
Aside from our duties of preparing drafts of official literature, and some teaching duties at the Chemical Corps School, this pretty well summarizes the types of work we do.

When you add to that the very extensive research programs of the OSRD agencies, and those of the British Commonwealth, and to a lesser extent those of the Navy and U. S. Public Health Service, you will understand that chemical warfare medicine was investigated on a substantial scale during the war. It is not surprising that some of the products of this research should prove useful for other purposes. This is fortunately the case in the field of clinical medicine.

Before briefly reviewing these developments, I should like to make it clear that the researches leading to these discoveries, and their applications to the practice of medicine, are the work of many hands in many places, both in this country and abroad. While the Medical Division played a part, and sometimes a substantial part, in all of these developments, none of them is wholly the work of any one agency. Time will not permit the crediting of contributions, individually to the many investigators, but this is, or will be, duly recorded in the scientific literature.

Early in the war the Oxford group in England under R. A. Peters, in their search for a chemical which could antidote the toxic actions of lewisite, discovered that certain dithiols were effective. The best of these, 2, 3-dimercapto-propanol, they called BAL, a code name for British Anti-Lewisite. You probably know that BAL oint-

ments and BAL in oil were then developed in this country as standard items for the Army. The success attained in treating lewisite arsenical poisoning with BAL suggested that it might succeed in antidoting other forms of arsenic poisoning.



A BIOCHEMICAL LABORATORY—Determination of the effects of chemical agents on vital body enzymes in the Warburg apparatus.

The most immediately available cases were seven individuals from this post who had arsenical dermatitis due to the chemical warfare agent DM. This distressing, itching skin irritation had persisted in six of these cases, despite all attempts at treatment, for 18 to 50 days. The cases were transferred to Dr. Longcope at Johns Hopkins Hospital and treated with BAL. The response was dramatic. All seven cases were promptly cured in an average of five days.

With this spectacular beginning, BAL was placed at the disposal of about 40 rapid treatment centers which were treating syphilis with arsenical drugs. Under the auspices of the U. S. Public Health Service, BAL was rapidly tried in these centers for a variety of the serious arsenical reactions which occasionally follow the use of the arsenical drugs. The most alarming and highly fatal reaction is that due to poisoning of the brain, commonly called arsenical encephalitis. Fifty-five cases of this type treated with BAL have already been reported.* The mortality was reduced from a previously very high figure to only 11 percent. All cases receiving prompt treatment recovered dramatically. Only cases which were seen and treated late died.

Another very grave reaction occasionally seen in these rapid treatment cases is agranulocytosis, a condition in which all of the granular white blood cells are destroyed and the bone marrow injured. There were 11 of these cases treated with BAL. Ten of them recovered rapidly and only one died, which is an extremely favorable record for these serious cases.

One of the most distressing reactions seen in these cases is exfoliative dermatitis, in which large areas of the skin inflame, crack open, ooze serum, and develop pustules. The itching and discomfort are intense and the patient is toxic and gravely ill. The severe cases which survive require from two to three months for the skin to heal. One hundred thirty-three such cases have been treated with BAL, according to reports from groups in this country and England. About 80 percent of these cases responded promptly to BAL, with marked relief from the distressing symptoms in about three days. They show 75 to 90 percent healing of the skin in two weeks This probably represents the maximum benefit due to the neutralization of arsenic in the lesions by BAL. Thereafter, the final bit of healing is by repair of the damaged tissue and the elimination of infection, which is a slower process and not influenced by BAL. However, the over-all time of final healing is shortened to slightly under 40 days, compared to 60 to 90 days when treated by other methods.

Sharp rise of temperature is another type of reaction seen in these cases. Of 44 such cases treated with BAL, 36 recovered in one to three days, and the other eight within eight days. Since this is a self-limiting condition, it is more difficult to assess the value of BAL in these cases.

BAL is definitely of less value for the jaundice and liver injury seen in these cases. It was of probable benefit in only five of the 14 cases reported. It was of no value in three cases of aplastic anemia due to arsenical drugs.

There have been four reported cases in which large fatal doses of arsenical drugs were injected into patients by error and treated with BAL in an attempt to save their lives. The first of these cases was grossly undertreated and died. The other three dramatically recovered, without the development of serious symptoms.

Experimental work by Medical Division showed that BAL, or certain of its analogues, were very effective in treating poisoning by other toxic heavy metals such as cadmium, zinc and mercury. With this information, arrangements were made by Dr. Longcope to have all bichloride of mercury poisoning cases from the Baltimore area admitted to Johns Hopkins Hospital, where he could treat them with BAL. My last check with the Hopkins group shows that they have now treated 43 cases of bichloride poisoning with only two deaths—an astoundingly low mortality. The

* Engle—J. Ven. Dis. Inform. (1946) 27:114

two cases which died were first seen many hours after they had taken the poison and were moribund on admission. The remarkable thing about the BAL-treated cases is that they recover no matter how large a dose of bichloride they have taken. Many had taken from 1.5 to 20 grams of bichloride, in which the expected mortality with any other treatment is about 75 percent. The

severity of effects in the BAL-treated cases is related almost entirely to the promptness of beginning the treatment. All cases treated within 4 hours of poisoning completely recovered in 2.5 to 7 days, whereas one case which was not treated for 19 hours required three weeks to recover from the severe injury to his kidneys.

Recently BAL has been applied to the treatment of gold poisoning, which sometimes occurs in the treatment of arthritis with colloidal gold sols. Toxic reactions to gold are quite serious and may result in fatal encephalitis or severe exfoliative dermatitis similar to those seen in arsenic poisoning. Twelve cases treated with BAL have so far been reported from three clinics, with prompt recovery in 11 of the 12 cases.

Some have considered it surprising that any of the war gases should prove useful as drugs. When it is remembered, however, that the term "highly toxic chemical" is practically synonymous with "highly active drug," there is less wonder that intensive studies of such compounds should reveal some of value to the physician. The nitrogen mustards are typical examples. Mechanism studies soon revealed that these compounds, when injected by vein, had a highly destructive effect on white blood cells, the lymph glands and bone marrow. This suggested their use in the leukemias, in which there is an overproduction of white blood cells, and in Hodgkin's disease and lymphosarcoma, in which there are tumor growths of the lymph glands. These are all fatal forms of cancer. From a cautious beginning, the trial of the nitrogen mustards in cancer has now spread to 126 clinics and hundreds of cases are now under treatment. More than 20,000 doses of HN-2 hydrochloride have been sent to these clinics and more than 500 case reports have been collected by the National Research Council Committee on Growth. You may be interested to know that the nitrogen mustards for this work were prepared by Technical Command right here at Edgewood. The treatment sets are prepared by Merck and Co. and distributed under the auspices of the National Research Council.

Clinical trials have been expanded to include a fairly wide variety of types of cancer. The Committee on Growth is now compiling the data from case reports. A summary of 30 cases of cancer of the lung has already been released, and other summaries will soon be published. In addition, about 130 other cases of cancer treated with the nitrogen mustards have been reported by several clinics in the medical literature. It is too early yet to draw many firm conclusions about the value of these agents in controlling cancer, but certain tentative conclusions appear justified.

If the cancer is operable, surgery is still the treatment of choice. If the disease is not operable, but is localized, intensive x-ray or radium therapy is the method of choice. If the disease is widespread, or if it responds poorly to x-ray, the nitrogen mustards should be tried, either alone or in combination with x-ray.

It is clear from the reports thus far that the nitrogen mustards probably do not cure any form of cancer, but they do prolong life in many instances and bring about remarkable remissions in some cases. They are most effective in Hodgkin's disease and in certain forms of cancer of the lungs, where they appear to induce good remissions in about 70 percent of the cases. The response of lymphosarcoma is spotty and the remissions are short-lived. They accomplish about as much in the leukemias as x-ray, but they are of less value than x-ray in most other forms of cancer.

The only nitrogen mustards released for clinical trial so far are HN-1, HN-2 and HN-3, which were selected and developed as chemical warfare agents, and *not* as therapeutic drugs. More than 60 additional nitrogen mustards have been prepared, and these are being studied now. It is possible that some of these may be much better cancer drugs. Animal experimentation has already shown that at least two of the new nitrogen

mustards are likely to be better for the treatment of cancer.

Another of the new chemical warfare agents which has found its place in clinical medicine is di-isopropyl fluorophosphate, or DFP. Mechanism studies revealed that this chemical would destroy the enzyme cholinesterase, which was a property not possessed by any other known drug. Other drugs merely suppress the enzyme for a few

A BIOPHYSICS LABORATORY—Identification of biochemical compounds and measurement of radioactivity with the Geiger Counter.

hours. This suggested its use in the treatment of myasthenia gravis, a condition characterized by extreme muscular weakness, and in glaucoma, a blinding disease of the eyes caused by increased fluid pressures in the eyeballs.

We may largely dismiss DFP as a drug for severe cases of myasthenia gravis. A fairly extensive trial has shown that it is too toxic to permit the administration of large enough doses to obtain the required intensity of local effects. In a few selected milder cases it has been of value, giving much more prolonged, though less complete relief than could be obtained with other drugs.

The story is different with glaucoma. In these cases DFP has not failed to control the disease in any case which could be controlled by any other drug or combination of drugs. But more important, it succeeded in controlling glaucoma in 36 of 78 eyes when all other drugs had failed. In addition, the effects of DFP were so prolonged that its administration was required only one-fifth as often as other drugs, averaging less than six doses per week. It offers an economic advantage, too. The 0.1 percent solution of DFP costs practically nothing. The other drugs are relatively expensive.

Physiological mechanism studies also revealed that DFP causes increased motility and contraction of the bladder and intestine. This suggested its use for the relief of urinary retention and distention of the bladder, which often occurs after general anaesthesia, and in invalids during prolonged confinement to bed. It has now been used for this purpose at the Johns Hopkins Hospital by Dr. McGehee Harvey in a considerable number of such cases, with uniformly excellent results. It fails only when the nerve supply to the bladder has been blocked or destroyed.

I should like to conclude this discussion by revealing to you the latest application of DFP, again by Dr. Harvey's group at Johns Hopkins. This is so new that it has not yet appeared in the medical literature and is largely unknown in medical circles except at Johns Hopkins and a few Army General Hospitals, to which the information has been sent through the Surgeon General's Office. I believe that this may well prove to be one of the most important discoveries and applications to clinical medicine that has thus far come from chemical warfare research.

One of the most troublesome and frequent conditions following abdominal surgery is paralytic ileus, in which the motility of the intestine is lost and the bowel distends with gas. The condition also occurs in severe illness, such as pneumonia, peritonitis and diseases of the spinal cord. Moderate cases make the patient miserable, with nausea, vomiting and abdominal pain and cramps. Severe cases are alarming and may cause the patient to become toxic, or even proceed to shock and death. Available means of treatment have heretofore been quite disturbing to these ill patients, and rather unsatisfactory in the severe cases.

At the date of my latest conference with Dr. Harvey, he had applied DFP to the treatment of some 57 of these cases, more than half of which were severe cases. Now DFP acts in two ways in this condition. If the case is a moderate one, DFP alone sensitizes the intestine and in the course of about an hour starts spontaneous, gentle, rhythmic contractions which soon relieve the distressing symptoms. These rhythmic contractions continue for some hours, so ordinarily two or three injections of DFP in 24 hours is enough. The dose, 1 or 2 milligrams of DFP initially and 1 milligram for subsequent doses, is too small to cause any undesirable side effects.

In severe cases, DFP also sensitizes the intestine but may not start the rhythmic contractions. After about an hour a small dose of either prostigmine or pitressin is administered. Before DFP, these cases had failed completely to respond to any dose of prostigmine or pitressin. But now

(Continued on page 51)

Chemical Training for Reserve Officers

Address Given to the Cincinnati Reserve Officer-Composite Group 18 December 1947

By LT. COL. RUBERT D. CHAPMAN
Plans, Training and Intelligence Division, OC

We in the Chemical Corps are vitally interested in the training of our Reserve Officers. We realize that the Regular Army establishment is but the nucleus for our forces and that on mobilization the officers' corps will be chiefly composed of Reserve Officers and that future success in any future conflict is dependent upon how well trained our Reserve Officers are when called to active duty.

Judging from the numerous letters received from Chemical Corps Reserve Officers, the two principal questions in their minds are: How is my training to be accomplished so that I will be a better officer, and what is the Department of the Army's plan for promotion of officers of the civilian components. In my few remarks I shall attempt to give you the thinking of our office relative to training of Chemical Corps Reserve Officers and the information I have been able to obtain from the various Department of the Army agencies relative to both training and promotion of civilian component officers. I wish to emphasize that this information represents the thinking of the agencies concerned and not approved plans.

In drawing up a training program for Reserve Officers, two types of units must be considered—T/O&E units and composite groups, or non-T/O&E units. Since the non-T/O&E units constitute the major problem in our training program, the greater part of this discussion on training will be devoted to units of this type.

For reasons which are apparent to any informed officer, the War Department has had to work since 1945 at the demanding task of reassembling the military establishment. The manifold uncertainties of the time have forced the basing of a great amount of high level planning for the civilian components upon assumptions. Among the major unknown in the ORC equation today are UMT, inactive duty pay, amounts of funds that Congress will appropriate, and when and where armories will become available. Incidentally, I might state here that the Department of the Army is sponsoring legislation to provide UMT inactive duty training pay for members of the ORC on a scale comparable with that now paid the National Guard, and among facilities for all civilian components. All other planning is affected similarly, yet when the whole structure is put together the pieces must fit. The ORC program is an important piece and a very complicated one, understood thoroughly by only a few. Irresponsible publicity, which undertakes to distort broad, high level statements of the Department of the Army's aims and requirements into implied promises, has neither simplified the problem or speeded its solution.

In order to help solve some of their problems the Commanding General, Army Ground Forces, assembled a group of senior Reserve Officers at his headquarters and assigned them some of the difficult problems. Among these were active duty requirements for retention of ORC commissions, promotion system for officers, finding appropriate assignments for individuals, eligibility for inactive duty pay, training and training facilities. As a result of this conference some highly useful comments and recommendations were produced. The Department of the Army is now making a study of these and other comments and recommendations with a view toward possibly making changes in present policies or methods of implementation of these policies.

On 21 May of this year the Chemical Corps was directed to draw up training policies and basic training plans of this Corps for the individual training of Chemical Corps Reserve Officers. After considerable thought and effort, our training branch drew up a plan for training of non-T/O&E units which we think will work. This plan embodies policies and programs for application by the Army Ground Forces in the training of Reserve Officers. In drawing up this plan a conscientious effort has been made to incorporate the many valuable suggestions made by officers of the Chemical Corps. It must be emphasized that this is only a proposed plan that has not been approved by the Department of the Army.

Essentially the Chemical Corps proposes a division, or classification, of Reserve Officers into three main groups:

Troop & Staff
Technical, Manufacturing & Inspection
Supply & Procurement

and emphasis on training appropriate to the officer's classification. When the number of Chemical Corps Reserve Officers warrants it within an area, it suggests that the Chemical Corps section of the composite group be further

divided into elements corresponding to the three main groups I have just mentioned and these elements (Troops & Staff, Supply & Procurement and Technical & Manufacturing) be given appropriate special projects. We plan to prepare tailor-made training programs and schedules for each group, which is necessary because of the varying types of experiences and education.

Subsequent to submitting our Chemical Corps plan, Army Ground Forces, after meeting with a committee of Reserve Officers, came to the conclusion that the formation of composite groups, the basis on which our plan was drawn up, was an unsatisfactory means of training non-T/O&E Reserve Officers. These groups were promptly and currently diagnosed as replacement pools and found favor nowhere. As a result, a study is being made by the Department of the Army, AGF and ZI Armies with the view to proposing an increase in the ORC troop basis to the extent of organizing certain bulk-type units, such as RTC's, station complements, and possibly some Com. Z establishments which, in the event of mobilization, will be needed early. This project may result in the absorption of many officers who find themselves assigned to composite groups. Early in November 1947 AGF recommended to the Department of the Army that the practicable maximum of non-T/O&E officers be transferred out of composite groups and organized into "ORC Volunteer" regiments, divisions, corps, staffs, Army staffs and various other types of units and entitled to essential home-training equipment under approved T/A's generally similar to those of Class "C" units. These "ORCV" units are proposed for the purpose of peacetime training and administration only. The title "ORCV," or some equivalent of it, is necessary because Army Regulations prohibit the issue of equipment to provisional units, as such, except to a very restricted degree. Whether the Department of the Army's action on this recommendation will be favorable cannot be predicted at this time.

Still other means to provide profitable and interesting training for composite group members are under consideration. These proposals are still so infirm at this time that to discuss them here would amount only to loose talk. Unfavorable geographic distribution and the conflicting demands of civilian occupations may force the retention of at least some officers in composite groups.

If the change from composite groups to "ORC Volunteer" units is made by Army Ground Forces in their training plan for Reserve Officers, this will involve a corresponding change in the Chemical Corps plan. As yet we have not been directed to make any change.

Members of the ORC who desire to volunteer for active duty training and are not fully informed as to existing opportunities or current procedures should contact their unit instructor for information and advice. If no unit instructor is available, full information may be obtained from the office of the State Senior Instructor, ORC. The opportunities for such training are increased somewhat and minimum efficiency index is no longer required to establish eligibility for active duty training.

This active duty training may be accomplished by:

(1) Attendance at regular courses and at associate basic and advanced courses at the Chemical Corps School.

(2) Two-week indoctrination course conducted at the Chemical Corps School.

(3) Detail of specially qualified Reserve Officers not over 90 days at higher headquarters, including the GS, USA, Headquarters Army Ground Forces, Office of the Chief, Chemical Corps; Army Headquarters, Service Schools and Class II installations.

(4) Detail of highly specialized officers as instructors at ROTC institutions and summer camps for not less than 15 days nor more than 90 days.

(5) Selected Reserve Officers for periods not to exceed 15 days to assist in organization of their units.

I know that many of you are interested in knowing what is being done towards formulating a promotion policy for officers of the civilian components. Briefly, I will attempt to outline the long range plan which was drawn by the Department of the Army, General Staff. I probably will not be able to answer all your questions relating to this plan, but I would like to have your questions and comments. Let me remind you that this is only a proposed plan and must not be construed as final or approved.

First, officers will be assigned either to the Active Reserve or the Honorary Reserve. The Active Reserve, in turn, will be broken down into two groups.

Group I includes those reserves who are physically and professionally qualified and are within the prescribed maximum age-in-grade. It will contain all officers assigned to Organized Reserves units or carried in augmentation groups for mobilization, assignments to administrative, technical, or staff positions or as filler replacements.

Group II will include those officers physically and professionally qualified for active duty who are relieved from Group I due to limitations of age or numbers in grade; unable to participate in required activities of Group I and who make a request for such assignment or are disqualified temporarily for Group I because of lack of professional fitness or physical defects, deemed remedial within a specified time.

Training funds will not be spent on Group II officers. They will not be eligible for promotion nor will any credit toward promotion or retirement, should a retirement law be passed, accrue to any officer while in Group II. Officers in Group II can be transferred to Group I if they are qualified and a vacancy exists.

In the honorary reserve will be placed those Reserve Officers whose service has been honorable and:

(1) Who have reached the maximum age-in-grade for Reserves providing they have completed 20 years' service.

(2) Or who, upon completing 20 years' service, apply for transfer to the honorary Reserve.

(3) Or who, having become physically disqualified, other than through their own misconduct, apply for transfer to the honorary Reserve.

The maximum age-in-grade for Group I officers of the Chemical Corps Reserve are as follows:

Second Lieutenant—30 years
First Lieutenant—34 years
Captain—41 years
Major—48 years
Lieutenant Colonel—55 years
Colonel—60 years

Reserve Officers will be promoted to the next higher grade providing vacancies exist in that grade and the following requirements are met:

(1) Promotion in T/O&E units will depend upon the vacancies occurring in such units.

(2) Promotion for non-T/O&E officers will be contingent upon the vacancies occurring within the authorized allotments of each Army Area.

(3) Have served a minimum time in grade based on the following:

Second Lieutenant—2 years
First Lieutenant—3 years
Captain—5 years
Major—3 years
Lieutenant Colonel—4 years

(4) Have completed the required active and inactive duty training and have efficiency reports of at least excellent.

(5) Have the appropriate professional and technical qualifications and experience.

(6) Have within one year prior to date of recommendation for promotion passed satisfactorily a physical examination.

(7) Have demonstrated command and staff ability at the appropriate level.

(8) Have been examined by a board of officers.

In order to insure a proper flow of promotions and prevent stagnation in grade, certain controls may be necessary from time to time to get the proper attrition, such is dependent upon a number of unknown factors, action will be taken to establish controls when the situation demands it. Possible methods for such are maximum time-in-grade requirements and stringent selection by the boards in considering properly qualified officers for retention in the Reserve.

The long range promotion plan, as generally described above, will be published in a policy form at the earliest practicable date dependent upon resolution of certain controversial issues, an example of which is the applicability of the plan to those Reserve Officers who served on extended active duty in World War II, and who are currently in grades at ages younger than the attainable minimum age-in-grade possible under the long range plan.

As to active and inactive duty training credits, on 28 November the Adjutant General was directed to publish a circular which contains the Department of the Army plan for awarding to civilian components officers' credits for active and inactive duty training, including extension courses.

The application of these credits to promotion, however, will be delayed until it is known whether or not the inactive duty training pay bill will be passed. If the training pay bill is passed the training requirements for promotion will be greater than can be required of personnel without pay.

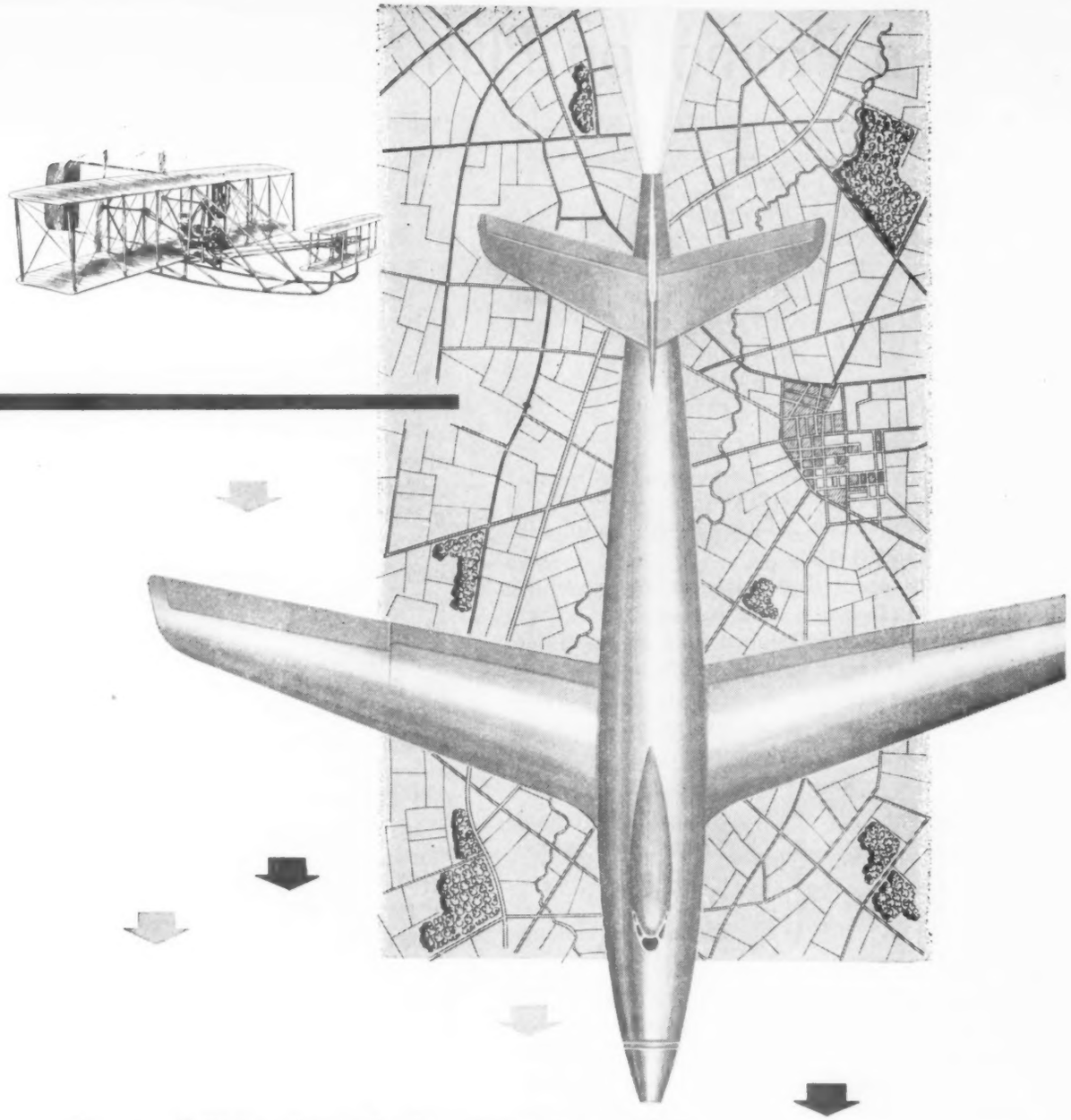
Before I close I would like to make a few remarks regarding the present and proposed Chemical Corps program. It is extensive, and with the drastic reduction in personnel keeps us extremely busy.

The Research & Development program is receiving all the emphasis we can give it. The details I cannot go into here, but you can be sure that the Chemical Corps is by no means a dead issue.

Our procurement and supply efforts aim at fully modernizing our methods, concurrently with current procurement and long range procurement planning.

The postwar planning for the Army is still undergoing changes, and will continue to do so. In spite of the relatively small size of this corps,

(Continued on page 59)



from kitty hawk to supersonics

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Interim Promotion Plan for ORC

Interim Promotion Policy—With reference to paragraph 35, Circular 356, War Department, 1946, and pending publication of the over-all promotion plan now in preparation for officers of the Officers' Reserve Corps, the procedures prescribed in this circular will govern permanent promotion of officers of the Officers' Reserve Corps assigned to Reserve T/O&E and T/D units to a grade not higher than colonel. The basis for these promotions will be the positions in the over-all peacetime procurement objectives for the mobilization requirements of units within each area command.

a. Requirements for promotion. In order to qualify for promotion, officers must fulfill the following requirements:

(1) Officers occupying position vacancies in T/O&E and T/D units of a higher grade than the one in which commissioned may be promoted one grade *after serving the minimum time in grade including service in AUS as listed hereafter, and including a minimum of one year in the position vacancy thus occupied.*

For Promotion to	Minimum Years in Grade	As
First Lieutenant	2	Second Lieutenant
Captain	3	First Lieutenant
Major	5	Captain
Lieutenant Colonel	3	Major
Colonel	4	Lieutenant Colonel

However, commanders must insure that a fully qualified and acceptable officer of the appropriate grade for the position vacancy is not available and must so indicate in the forwarding indorsement. *No officer will be authorized more than one promotion under these provisions.*

(2) Pending publication of additional requirements, professional qualifications for the grade to which promoted shall be evidenced by the manner of performance of his military duties in the grade in which serving. The manner of performance of duties will be indicated in the recommendation.

(3) The officer has been examined and recommended by a board as provided under paragraph 6, Circular 356, War Department, 1946. The board will be governed by applicable provisions of AR 420-5. The boards shall be convened for this purpose by authority of the commanding general of the area command.

(4) The officer concerned has within one year prior to the date of recommendation for promotion passed satisfactorily a final type physical examination, less serology, chest x-ray, electrocardiogram, audiogram determination, microscopic urinalysis and lens correction and for female personnel less pelvic examination, unless indicated, and report thereof submitted on WD AGO Form 63. This physical examination may be given by any medical officer of any component of the Army of the United States whether on active or inactive status. The signature of only one Medical Corps officer is required.

b. Recommendations for promotion—Recommendations for promotion under these provisions must be initiated by the immediate commander under whose jurisdiction the officer is currently assigned through unit instructor and Senior State Instructor.

(1) When action by the examining board has been favorable, all papers will be forwarded with recommendation by the commanding general of the area command concerned to The Adjutant General, Attention AGPR-A, for consideration and final action.

(2) The findings of the Board will be accompanied by a report of physical examination as prescribed made within one year previous to the date of recommendation, and a statement specifying that each requirement under these provisions has been fulfilled.

(3) After final approval action will be taken by TAG to promote the officer concerned in the name of the President.

2. These instructions do not pertain to officers in the Air-Reserve, as separate instructions will be published pertaining to such officers.

COL. KUHN ELECTED DIRECTOR OF CONSULTING CHEMISTS ASSOCIATION

The election of Col. Harry A. Kuhn, USA, Ret., as Director was announced at the 20th Annual Meeting of the Association of Consulting Chemists and Chemical Engineers in New York, October 28. Col. Kuhn is now a consulting chemist in Washington, D. C.

EX-CHEMICAL OFFICER PARTICIPATES IN QUIZ PROGRAM

Former Chemical Corps Captain Nathaniel Colley from Alabama and Mrs. Colley, now attending the University at New Haven, Conn., won $300 for identifying speakers of famous remarks during World War II on the "Break the Bank" quiz program 12 December 1947.

Reserve News

Something new has been added to the Chemical Corps Journal! It is this section, which will be devoted each issue to the representative questions of those now on reserve status, and will also serve as a medium for disseminating the latest pertinent information.

Industrial College Training for Reserve Officers

The Industrial College of the Armed Forces will conduct a series of two-week training courses for Reserve officers, educators and executives of industry.

The purpose is to foster interest on the part of Reserve officers, educators and executives of industry in problems incident to economic mobilization, so that in the event of a future emergency those who attend the courses may have some understanding of the fundamental problems that will confront this nation. The course will be divided into two phases. The first phase, to be given to Reserve officers only, will be a summation of current military matters, providing the student officers with up-to-date information concerning the latest thought in military concept, planning, organization and regulations. The second phase of the course, to be given to Reserve officers and offered to industrial executives and educators, will consist of instruction in basic problems of economic mobilization, including procurement planning, economic warfare and industrial mobilization. The Army and Navy Munitions Board has been invited to participate in that part of the instruction which is concerned with the Industrial Mobilization Plan.

The courses will be given by a specially trained group of about seven Army and Navy officers from the faculty of the Industrial College of the Armed Forces and will be modeled after the complete course of instruction now being given at the college. The course will cover two five-day weeks; the daily hours will be from 1000 to 1200 and from 1300 to 1500. Appropriate visual aids will be utilized. Obviously, in a two-week course only the most important matters can receive consideration, and therefore the instruction given will be planned to stimulate further thinking. The courses will be conducted in areas which have a heavy concentration of industry. The cities selected may not be visited each year; it appears that courses should be conducted in the larger industrial areas each year, and in the smaller industrial areas every two or three years. Reserve officers who take this course will be ordered to active duty for the two-week period.

The institution of the course will provide those who attend with an orientation in and an understanding of the problems of economic mobilization, which, it is believed, will awaken and maintain interest in this subject. The course will supply a group of Reserve officers instructed in the fundamentals of industrial mobilization to augment the group of Regular officers who are trained in the complete course in Washington. It is pointed out that the proposed methods of operation and instruction are the best practicable means of reaching the type of Reserve officer and industrialist who will be invaluable in accomplishing the prompt mobilization of industry in an emergency.

Plans call for courses to start in New Orleans in January 1948, Birmingham in February, San Francisco in March, New York City in April, Pittsburgh in May, and Chicago in June.

Each Army area will be allotted the following quota of Reserve officers to attend these courses.

(a) Army Reserves—20 per army
(b) Navy Reserves—20 per army
(c) Air Force Reserves—20 per army
(d) National Guard—1 per state
(e) Civilians—40 per army

Training of ORC Personnel 1st Quarter Fiscal Year 1948

The number of Reserve personnel who received active duty training during the first quarter of the fiscal year 1948 is as follows:

Armies	*Officers*	*EM*	*Total*
First	1517	464	1981
Second	1919	296	2215
Third	872	243	1115
Fourth	571	64	635
Fifth	1085	113	1198
Sixth	454	19	473
	6418	1199	7617

Type of Training:

Schools	1931
Training Div.	1855
Other	3831
	7617

Army Information Digest

The following information relative to Reserve officers receiving the Army Information Digest is furnished by the Editor of the Army Information Digest.

"A number of requests have been received by the Editor of the Army Information Digest to add Reserve Officers to the Regular mailing list. Although the Digest is sent to Reserve units it is not feasible at this time to send it to individual Reserve officers.

"However, it is available on a subscription basis through the Superintendent of Documents, United States Government Printing Office, Washington 25, D. C. The price is $1.50 a year. Sample copies will be sent to any address on application to the Editor, Army Information Digest, Carlisle Barracks, Pennsylvania.

"The Army Information Digest is published monthly by the Department of the Army. Its contents are prepared under the supervision of the Commandant Army Information School, on behalf of the Chief of Information, Department of the Army. The Digest is designed to provide information about the Army to members of the military establishment."

Individual Tours of Active Duty Training for Members of Organized Reserve Corps

In general, the duration of active duty training tours will be limited to ninety (90) days. It is intended that the individual Reservist be limited to one active duty training tour of from sixty (60) to ninety (90) days, or to an accumulation of shorter tours not to exceed ninety (90) days per calendar year.

Extract From "Public Information and National Security Program," Dated November 1947

"Training programs for elements of the Organized Reserve Corps fall into various categories of manpower military requirements. These requirements call for Officer, Enlisted and Unit reserve strength.

"One of the important Unit-training projects which currently is being implemented is known as the 'Affiliation Plan.' Under this plan voluntary agreements are signed between industrial, scientific, and other civilian organizations and the Army which provide for the military training . . . of certain civilian occupational groups. These occupational groups are designated 'service-type units,' which means that they have their counterparts in the established military departments. As a result of their military training these civilian units could, in the event of a national emergency, be inducted into the Army on a group basis and as reserve increments already qualified in military-service specialties.

"The Affiliation Program is receiving wide support from civilian industrial and professional organizations. To date more than 600 reserve affiliations have been announced by the Army.

"Current figures show that there are some 6,000 Reserve combat and service-type units activated to date made up of approximately 500,000 officers and 600,000 members of the Enlisted Reserve.

"The peacetime problem of the Reserve Officers Training Corps likewise is one of expansion to serve the needs of the Army over a long-term period of officer requirements. Currently it is estimated that the National Guard and the Organized Reserve Corps together will require an annual officer input of 27,000 to 28,000 to offset normal attrition among those now commissioned. In addition, an estimated 2,000 officer requirement of the Regular Army will need to be met. In round numbers, then, the ROTC will be called upon to produce approximately 30,000 officers per year.

"The production of 30,000 ROTC graduates per year, which is more than twice the peak ever reached, will require a minimum of 255,000 enrolled in the four years of collegiate program. In other words, about 8½ students will be required in the pipeline for every graduate produced.

"By 1951 it is expected that there will be at least 703 senior ROTC units of the several arms and services in 250 colleges and universities. Several branches which were not represented in the ROTC at the beginning of World War II have been established—the Air Force, the Transportation Corps, and the Army Security Agency.

" 'One of our biggest responsibilities to the United Nations is to maintain a combat force which will be instantly available to the United Nations to maintain international security through a world police force. In addition, it is certainly implicit in the United Nations agreements that smaller, weaker nations who look to the United States for help have only our strength to rely upon. They certainly cannot afford adequate military forces of their own. The unanimous treaty for mutual defense recently signed with the Latin American nations adds to our international obligations and further increases the need for an adequate striking force. Without such a force we are not only letting down our friends and potential allies, we are endangering the entire future of the United Nations. Today we do not have an adequate force for this purpose. So we see that not only are we deficient in preparedness for future emergencies, but we are also

deficient in strength needed fully to meet current commitments.'—General Collins."

* * * * *

Six AGF schools will be utilized for two-week indoctrination courses, which will be held for Reserve and National Guard officers of all branches of the Army. Courses with a class capacity of 40 will be held at the Chemical Corps School.

The classes, which will consist of 41 hours of staff and administrative and 31 hours of chemical warfare subjects, are scheduled as follows:

Class No.	*Reporting Date*	*Closing Date*
1	11 Jan 48	24 Jan 48
2	8 Feb 48	21 Feb 48
3	7 Mar 48	20 Mar 48
4	4 Apr 48	17 Apr 48
5	2 May 48	15 May 48
6	6 Jun 48	19 Jun 48

Reserve and National Guard officers desiring to participate should apply through the normal Army Ground Forces channels and not directly to the Chief, Chemical Corps, nor to the Chemical Corps School.

Postwar Army Extension Course Program

The postwar Army Extension Course program, one of the most far-reaching and comprehensive programs of military education ever undertaken by the Army, is now well under way with nearly 150 courses currently available to qualified personnel, Gen. Jacob L. Devers, Commanding General, Army Ground Forces, revealed recently.

In addition to those now available, new courses are now in the process of preparation by the various arms and services, and it is anticipated that approximately 1,000 will be completed within the next three years.

Established in March, 1946, the postwar program is primarily designed to provide a systematic course of home study for the thousands of members of the Organized Reserve Corps and the National Guard who desire to keep prepared for wartime assignments and duties by keeping abreast of the latest in military developments.

"I consider the Army Extension Course program one of our most vital training adjuncts," General Devers stated. "With so many new fields of knowledge opened as a result of experience gained in World War II, every man now or formerly in uniform can benefit considerably by taking advantage of these correspondence courses."

An important step in the implementation of the program was taken this past August when Army Ground Forces held a service-wide Extension Course conference at Fort Belvoir. Leading result of the conference, at which matters of general policy were discussed, was to effect a closer coordination between the ground arms and technical and administrative services in the administration of the program.

The courses, which are being administered by the various ground and administrative and technical schools in the six Army areas, are arranged in six series of subcourses for each of the arms and services, and are adapted according to the military grades of the enrollees. They are designated as follows:

10-series—for basic instruction of enlisted men and Warrant Officers; 20-series—second lieutenants; 30-series—first lieutenants; 40-series—captains; 50-series—majors; and 60-series—lieutenant colonels.

Each complete series consists of approximately fifteen subcourses, numbered serially in the order in which they are normally studied. A subcourse consists of at least three and not more than nine lessons and an examination or review lesson. To maintain an active enrollment, a student is required to complete at least ten lessons in one or more subcourses annually.

The following is an example of a subcourse broken down:

Subcourse 40-10 "Joint Air Ground Operations."

Lesson 1. Joint Operations of Tactical Aviation.
Lesson 2. Planning of an Attack Against an Organized Defensive Position.
Lesson 3. Conduct of the Attack Against an Organized Defensive Position.
Lesson 4. Coordination and Control During a Pursuit.

An important development in the program, recently approved by the Department of the Army, concerns the granting of extension course credit for resident courses previously taken at branch schools. Officers and enlisted men who successfully completed courses at any branch school during the war, and who enroll for extension courses, are now given credit for those subcourses which parallel the material already taken, and are exempt from repeating them.

Applicants for enrollment who are assigned to

Reserve or National Guard units should apply to unit commanders or instructors who forward applications for students of the ground arms in courses of the 10-series to the Ground General School, Fort Riley, Kansas; for students of the ground arms in courses of the 20-series or higher to the school of the appropriate branch; and for students of the administrative and technical services in any series to the school of the appropriate branch. Applicants not assigned to units should apply directly to the Army commander in the local Army area.

Chemical Corps Extension Courses

The Commandant of the Chemical Corps School wishes to urge all Chemical Reserve, National Guard and Regular Army personnel, officer and enlisted, to avail themselves, if possible, of the training offered through the Army Extension Courses. Administration is handled by the Extension Course Branch, Chemical Corps School, Army Chemical Center. Preparation and revision of subcourses is and will be a continuing process over a period of years, as new doctrine develops and texts are prepared. An extensive writing program is now in progress. The subcourses listed below, however, are now available. (The 50 and 60 series subcourses for Majors and Lieutenant Colonels, respectively, prepared by the C&GSC, should be available shortly after this article appears.

10 Series (Basic Military Instruction)

10-3 Leadership, Discipline, Courtesy and Customs of the Service; Credit: 8
10-4 Military Sanitation; Credit: 15
10-6 Military Law—The Law of Military Offenses; Credit: 20
10-7 Drill and Physical Training; Credit: 12
10-8 Map and Aerial Photograph Reading I; Credit: 20
10-9 Interior Guard Duty; Credit: 10
10-13 Administration I; Credit: 19
10-18 Security Against Chemical Attack; Credit: 16

20 Series (2d Lieutenants)

20-1 Chemical Agents; Credit: 18
20-2 Chemical Materiel; Credit: 18
20-3 Methods of Instruction; Credit: 14
20-6 Military Law—Courts Martial; Credit: 22
20-7 Materiel—4.2-Inch Chemical Mortar; Credit: 8
20-13 Materiel—Flame Throwers and Flame Thrower Fuels; Credit: 12
20-17 M2 Mechanical Smoke Generator; Credit: 11
20-18 Tactical Employment of Chemicals I (War Gases); Credit: 16

30 Series (1st Lieutenants)

30-1 Administration II; Credit: 23
30-2 Map and Aerial Photograph Reading II; Credit: 20
30-4 The Chemical Mortar Company; Credit: 21
30-5 Chemical Corps Service Units; Credit: 19
30-25 Signal Communications for All Arms and Services; Credit: 20

40 Series (Captains)

40-1 Map and Aerial Photograph Reading III; Credit: 16
40-3 Staff Organization and Duties of Chemical Officer I; Credit: 14
40-4 Rules of Land Warfare; Credit: 16
40-6 Chemical Mortar Battalion I; Credit: 15
40-9 Counterfire Organization and Techniques; Credit: 16

The following information is furnished for the benefit of those members of the Association unfamiliar with the prewar program (Ref: AR 35-3000).

The courses are open to all Reserve, National Guard, and Regular Army personnel, and certain civilians in government employ. Normally an officer will register for a given series appropriate to his grade. Many officer students, on the other hand, are taking special work in lower series to further their military education in subjects with which they had no wartime experience. All warrant officers and enlisted men may enroll for the 10 series of any school, and/or may take certain subcourses of special interest in other than the 10 series.

For personnel assigned to regularly organized units of the ORC, NG, or RA, application for enrollment should be made through the commanders of the said units. ORC personnel not part of organized units should apply through the Senior State Instructor ORC. Civilians in government employ should apply for special courses through channels.

As we go to press the requirements for ORC promotions with reference to the over-all Army Extension Course program has not been enunciated. Announcement of this policy is expected soon.

Minimum requirements for all students are as follows: Two (2) lessons per quarter; a total of at least ten (10) lessons annually. Before canceling enrollments, special consideration is given to illness or other circumstances beyond the control of the student.

The Chemical Corps School will be glad to furnish information on details of the extension course of the school or information on subcourses of other schools on application. All chapter officers and members of the Association are urged to give publicity to the training offered.

Training of Officers in Civilian Institutions

By CAPTAIN JOEL B. MARANGELLA
Office Chief, Chemical Corps

Under the comprehensive program for career management in the new Army, training is an important objective in time of peace. A phase of career-training for Chemical Corps officers on active duty includes training in civilian institutions throughout the United States. Students are carefully selected to attend various schools, in accordance with the following established procedure:

a. The individual officer submits a letter of application to the Chief, Chemical Corps, through channels, setting forth the type of schooling he is specifically interested in, any preferences he may have for particular civilian schools, and the qualifications which he possesses as a result of previous schooling or experience. The applicant includes with this letter a transcript of his academic record which is used in evaluating his eligibility for the training requested and for meeting the school entrance requirements.

b. Students are selected on the basis of the information furnished in their applications, and in accordance with the recommendations and requirements of the various divisions of the Office Chief, Chemical Corps, for trained officer specialists. For example, if the Research and Engineering Division indicates a requirement for officers trained in the graduate field of chemical engineering, the Training Branch, Plans, Training and Intelligence Division, will then screen applications received for this type training, determine eligibility, and, providing funds are available, make final selection from those best qualified. In this connection consideration is also given to the career pattern which has been planned for this officer and whether or not he has previously completed military training in service schools appropriate to his age and grade, or has the equivalent credits.

It should be pointed out that selections for this training must be made well in advance of the proposed periods of training as spaces in the various schools have to be secured before contractual arrangements can be made. Normally training requirements are determined during the early part of one fiscal year for the following fiscal year and these submitted to the Director of Organization and Training, General Staff, U. S. Army, for approval. Providing these requirements are approved, the Organization and Training Division requests The Adjutant General to contact the respective schools to secure the required number of spaces. Once this has been accomplished, the Chemical Corps is authorized to deal directly with the schools in order to obtain admission of the student officers selected. When the school informs the Chemical Corps that the student has been accepted, The Adjutant General is requested to execute the necessary contract and orders are duly issued to the student officer concerned.

In conjunction with the training in civilian universities, selected officers are sent for further training to appropriate industrial concerns where, for periods up to one year in duration, these officers are able to observe and study technological and managerial processes and procedures.

During the current year the following Chemical Corps officers are undergoing training in civilian institutions:

	Course	School
Lt. Col. Carl S. Casto	Bus. Adm.	Harvard
Lt. Col. John J. Duffy	Bus. Adm.	Harvard
Lt. Col. Wm. S. Hutchinson	Cml. Eng.	MIT
Lt. Col. H. S. Markham	Bus. Adm.	Harvard
Lt. Col. Ronald L. Martin	Bus. Adm.	U. of Penn.
Lt. Col. George R. Oglesby	Cml. Eng.	Ohio State
Maj. Herbert F. Crecelius	Bacteriology	U. of Michigan
Maj. Thomas H. Gibson	Phys. Chem.	U. of Virginia
Maj. John G. Hoffman	Cml. Eng.	U. of Illinois
Maj. Charles A. Morgan	Bus. Adm.	U. of Michigan
Maj. Robert K. Nelson	Bus. Adm.	U. of Penn.
Maj. Lowell E. Thompson	Cml. Eng.	Ohio State
Maj. Dale L. Vincent	Undergrad.	U. of Wyoming
Lt. Robert S. Day	Cml. Eng.	MIT

WAHOO FISHING IN PANAMA CANAL ZONE

Pfc. Grover F. Coggins of the Chemical Corps proudly displays a catch of five wahoo, the result of a day's fishing in the waters surrounding San Jose Island, Republic of Panama.

These fish, a member of the mackerel family, averaged better than 25 pounds each. They are the best game fish in the sea, put up a terrific fight attesting to the skill of the angler who brings them in. Together with the sailfish and black marlin, the wahoo is much sought after by skilled fishermen.

Chemical Corps Troops and Training in the Years Between the Two Wars

By LEO P. BROPHY, *Ph.D.*
Historian, Chemical Corps

In the years of peace which we now have, at least temporarily, at our disposal, it should be interesting and perhaps even profitable to look back at the period of peace between World War I and World War II and examine some of the aspects of chemical warfare training in that period. The study of an institution's history, or some phase of it, is always interesting, especially to those associated with the institution, and it is with this thought in mind that the writer has undertaken to briefly review the story of Chemical Corps (then Chemical Warfare Service) Troops and Training following World War I. Whether the study of history is equally as valuable as it is entertaining is a much debated question. After having rubbed elbows with it for a few years, the writer has come to suspect two types of individuals who make references to "history." One type uses the phrase, "history shows us," while the other declares, "the only thing that we learn from history is that we learn nothing from history." Almost always the individuals who employ such catch-all phraseology will be found to know little or no history. That history teaches us something is undoubtedly true, but it requires a great deal of thought and effort on an individual's part to learn just what that something is. With no extra charge for this observation, the writer shall proceed to a discussion of the subject under consideration.

Following our entrance into World War I the War Department assigned functions connected with chemical warfare to various of its branches. The Surgeon General, Ordnance, Engineers, and Signal Corps each supervised some phase of chemical warfare activities and for good measure the Bureau of Mines in the Department of Interior carried on chemical research for the War Department. Training was divided between the Surgeon General, who trained officers and men to use gas sampling apparatus and other means of defense against gases, and the Corps of Engineers, who trained soldiers *to actually carry* gas warfare to the enemy. On 15 August 1917 the War Department authorized one regiment of Gas and Flame troops, designated as the 30th Engineers. The dual training responsibility lasted until early 1918, when the Medical Department was relieved of chemical warfare training and sole responsibility was placed in the hands of the Engineers.

Meanwhile, *the need* for unified control of all chemical warfare functions *was being realized.* This idea took root first in the AEF, where on 3 September 1917 a Gas Service was set up under the command of Lieut. Col. Amos A. Fries. Six weeks later the first step was taken towards setting up a unified organization in the Zone of Interior, when on 16 October the Secretary of War authorized the establishment of a Gas Service Section in which an officer of Engineers, not above the rank of Colonel, should be appointed director. A second step was taken in May 1918, when the Director of the Gas Service Section, Maj. Gen. William L. Sibert, a distinguished Engineer officer who had built the Gatun locks of the Panama Canal, was instructed to formulate a plan for better coordination of chemical warfare. It was General Sibert's plan which led to President Wilson's Executive Order of 25 June 1918 setting up the Chemical Warfare Service (hereafter CWS), National Army. The President's order was issued pursuant to the Overman Act and CWS was therefore an emergency organization which would automatically cease to exist six months after the termination of the emergency. Under the Appropriations Act of 1919, however, Congress authorized its existence until 30 June 1920. On 1 July 1920, the Service was made a permanent branch of the Army under the terms of Section 12a of the National Defense Act, as amended. A few months previous General Sibert had retired and was succeeded by the Lieutenant Colonel who had been put in command of the Gas Service in the American Expeditionary Forces (hereafter AEF) in 1917, now Maj. Gen. Amos A. Fries.

Following the establishment of the CWS in June 1918, all chemical warfare training activities were put under its supervision. A Training Section was established to supervise the following functions: (1) the organization of gas troops and casual detachments for overseas duty; (2) the establishment of a chemical warfare camp; and (3) the procurement and training of officers

for overseas duty. A camp with a capacity of 1,300 officers and enlisted men was set up near the Lakehurst Proving Grounds in New Jersey, known as Camp Kendrick. The 30th Engineers, Gas and Flame, was likewise transferred to CWS jurisdiction, (Gnl Hdqs AEF, *General Orders No. 133*, 9 Aug 1918), and became known as the First Gas Regiment. Early in February 1919 the regiment was brought back to the United States and mustered out as a temporary military organization in March. By virtue of the Act of 4 June 1920 which set up the Chemical Warfare Service as a separate and permanent military organization, the First Gas Regiment was reestablished. The Act provided for a quota of 100 officers and 1,200 enlisted men. Some time in 1920 the enlisted men's quota was reduced to 776 and by 1936 it had been reduced still further to 715. Of this number, about 680 were in the First Gas Regiment. Although the officers' quota was never reduced, it seems to have been held at about 92.

The First Gas Regiment was in existence until January 1929 when its name was changed to First Chemical Regiment. In 1931 a Second Chemical Regiment was formed. In 1935 the First Chemical Regiment was rendered inactive and its personnel transferred to other chemical units. The designation of these units was from time to time changed, but it is not within the province of this article to trace these changes. As of 24 September 1940 the active organizations of chemical troops were as follows:

Company C, 2nd Chemical Regiment, Fort Benning, Georgia
Company A, 1st Separate Chemical Battalion, Hawaii
Hq & Hq Company and Company A, 2nd Separate Chemical Battalion, Edgewood Arsenal
Hq Detachment, Edgewood Arsenal
1st Separate Chemical Company, Panama
1st Chemical Company (Decon), Fort Eustis
1st Chemical Company (Lab), Edgewood Arsenal
10th Chemical Company (Main), Edgewood Arsenal
412th Chemical Company (Depot), Edgewood Arsenal

The National Defense Act stated that among the duties of the Chief was "the supervision and training of the Army in chemical warfare, both offensive and defensive, including the necessary schools of instruction, the organization, equipment, training duties as the President may from time to time prescribe." The Chief, CWS, delegated to the Operations, Training and War Plans Division in his office the supervision of training. In this capacity the chief of that Division was responsible for training at the Chemical Warfare School, the First Gas Regiment and other Special Chemical Warfare troops and the training of the entire Army in both offensive and defensive chemical warfare. He was charged with the preparation of all manuals pertaining to training of Special Gas Troops in chemical warfare, including troops of the mobile Army, Coast Artillery, National Guard and Organized Reserves.

In January 1920, CWS set up a school for officers at Lakehurst, New Jersey, which was transferred the following September to Edgewood Arsenal. Officers, both commissioned and noncommissioned, from the various military branches (CWS, Regular Army, National Guard, CWS Reserves, Navy and Marine Corps) were enrolled at the Chemical Warfare School. Here training was given for the following objectives: preparation of chemical division officers for emergency commissions, training of both commissioned and noncommissioned officers of the combat arms, training of the National Guard and Organized Reserves for duties as regimental and battalion gas officers and noncommissioned officers. Courses fell into four categories: the Regular Course, Field Officers' Course, the Line and Staff Officers' Course, and the National Guard and Reserve Officers' Course. Average school enrollment during the period was approximately 60 students. From the time of its inception till the advent of World War II, the Chemical Warfare School trained a total of 3,858 officers, 643 enlisted men and 466 civilians.

In conformity with his mission to train the Army in chemical warfare, the Chief furnished other Service schools with CWS officers to act as instructors in chemical warfare subjects. Such officers were on the faculties of the Command and General Staff School, the Infantry School and the Air Force Tactical School. CWS instructors at the Coast Artillery School were furnished by the Chemical Warfare School on a loan basis for a period of about six weeks each year to cover chemical subjects. The Chief employed various means for instructing the Army in the latest developments of chemical tactics and materiel. Chemical troops at Edgewood Arsenal, for instance, were utilized to demonstrate chemical warfare materiel and tactics for the Chemical Warfare School. Again, chemical companies in Panama, Hawaii and the Philippines participated in the tactical exercises of their respective divisions and the chemical company at Fort Benning was used in demonstrations for the Infantry School in addition to participating in tactical exercises with the Infantry stationed at the Fort.

Another type of educational agency was the Divisional and Corps school for regimental and battalion gas officers, conducted in accordance with the corps area training memorandum. It was the responsibility of corps area chemical officer to recommend to his commander instructions for chemical warfare training. These instructions had to be consistent with the training instructions in chemical warfare recommended by the Chief, CWS. In addition to the various schools mentioned, there were ROTC units at the Massachusetts Institute of Technology and at the Agricultural and Mechanical College of Texas. Selected officers of the Service attended MIT for chemical engineering; University of Wisconsin for biological training; and Harvard University School of Business Administration for two-year periods for advanced instruction. Last but not least, there were the Corps Area Extension Schools, which offered courses in chemical warfare for members of the National Guard, Organized Reserves and Regular Army. All instruction by outside agencies was guided by the Office of the Chief, CWS.

The Organized Reserves were made a feature of our military establishment following World War I in an effort to improve the quality of available officer material. By the early 1930's there were over two thousand officers in the CWS Reserve Corps. Many of these officers were associated with the chemical profession or with accounting or law. They were not, it would seem, encouraged to dally away their spare moments or spend their nights living riotously. At least that is the impression one gets from the reading of a talk given by Maj. Gen. H. L. Gilchrist, Chief, CWS, to a group of Reserve officers in New York City in 1932.

> In the Training Division of my office in Washington [the chief said], there are stacks and stacks of documents being prepared for distribution to you gentlemen of the Reserve Corps. On one table are piles of correspondence courses, asking certain questions as to what an officer should do in every conceivable situation. On another are copies of texts which are to be used in answering these questions. On still another are piles of mail pertaining to training camps and schools, which are to be sent out to you through Corps Areas.
>
> In the Personnel Division are hundreds of letters being addressed to Reserve Officers notifying them as to new assignments, wartime duties, etc., also questionnaire cards to be filled out, requesting all kinds of information as to their experience, business and previous condition of servitude.
>
> Apparently you gentlemen are being bombarded with letters, circulars and correspondence of every conceivable description. I often wonder how you stand up under this bombardment and barrage of paper work from the typewriter and printing press. It is certainly a joy to be able to see the men who are sufficiently interested in our National Defense to withstand this great assault of printed matter.

On another occasion, General Gilchrist remarked that it would be highly desirable if every Reserve Officer could have active duty for at least two weeks each year, "but unfortunately appropriations are not sufficient to permit this, nor could the small Regular Army nucleus handle such a big training proposition." The War Department, under the circumstances, trained approximately one-fifth of the Reserve Officers each year.

No account of chemical warfare training, however brief, in the years between World War I and World War II would be complete without some reference to War Department directives regarding offensive chemical training. Although the National Defense Act charged the Chief, CWS, with training the Army in "chemical warfare, both offensive and defensive," the War Department General Staff directed that only training in defensive warfare be given. The attitude of the General Staff was influenced by the several antigas treaties and proctocols drawn up during the postwar years. The first of these was a treaty emanating from the Washington Disarmament Conference of 1921-1922. Two more such treaties were drawn up in 1923 as the result of conferences of inter-American States and a fourth such treaty, or so-called protocol, was written in Geneva in 1925. Although the representatives of our Government participated in these conferences, no antigas treaty or protocol was ever ratified by our Government. In spite of that fact, the attitude of the General Staff was affected in no small degree by these treaties. For years correspondence over the question of offensive training passed between the Assistant Chief of Staff, G-3, and the Chief, CWS. The former insisted that only defensive training be applied, while the latter put forth arguments in favor of both offensive and defensive training, pointing out among other things the virtual impossibility of distinguishing between the two. Finally in May 1930 the Judge Advocate General decided that both offensive and defensive training were within the law.

In April 1939 the CWS officer quota was increased by Congress to 124, subject to variation by the President by not more than 30 percent. Following the outbreak of war all provisions of law limiting the quota of any branch of the Army was to be suspended. During 1939 provision was made for the training of four basic chemical

companies and early in 1940 recommendations were made for the activation of thirteen CWS units as increments to the armies. These units included the following: laboratory, decontamination, impregnating, depot, maintenance, and mortar companies. The two major means for training Reserve Officers were through extension courses and 14-day instruction camps. Over 1,000 officers were enrolled in correspondence courses during 1939-1940, and summer training camps for ROTC students from CWS units of the Texas Agricultural and Mechanical College and of the Massachusetts Institute of Technology were also conducted by CWS. The 14-day "Camp of Instruction" held annually at MIT was devoted to specialized technical instruction. In August 1939 the course was planned for approximately 25 Reserve Officers distributed in grades from second lieutenant to major. In August 1940 Congress passed a law to call out the National Guard and the Organized Reserves and the following month the Selective Service Act was passed. In May 1941 by War Department directive a Chemical Warfare Service Replacement Training Center was activated at Edgewood Arsenal.

The rapid growth of training activities led to a reorganization of Operations, Training and War Plans Division of the Office of the Chief in July 1941. A new Plans-Training Division was established after the following manner: (1) the War Plans and School Branch prepared the CWS mobilization plans and coordinated chemical warfare matters pertaining to foreign defense projects, and supervised courses at the Chemical Warfare School at Edgewood Arsenal; (2) the Replacement Center Branch concerned itself with all matters of "chemical warfare training in replacement and unit centers, including the preparation of mobilization training programs"; and (3) the Training and Publications Branch compiled material for field and technical manuals and extension courses.

Such was the status of Chemical Warfare Service troops and training when the Japanese attack on Pearl Harbor took place. During the years prior to 1939 the quota of officers was kept at a very low figure and the enlisted men's quota was reduced on several occasions. After the emergency came and especially after the passage of the Selective Service Act, CWS faced the difficult task of quickly training an unprecedented number of troops. One wonders if it would not have made for greater efficiency and economy to have maintained a stronger chemical warfare training organization in the years preceding the emergency.

CHEMIST RETIRES

RALPH W. PEAKES

Ralph W. Peakes, for twenty-four years a chemist with the Chemical Corps, retired last year at the Army Chemical Center, Md.

Mr. Peakes was educated at Massachusetts State College and Harvard Graduate School.

He was employed by private industry from 1908 to 1921 and joined the Chemical Corps in 1922.

From 1922 to 1935 he was employed as a research chemist, and from 1935 until his retirement he was connected with the Research and Engineering Division, Office of the Chief, Chemical Corps, as senior chemist and as consulting chemist.

Mr. Peakes was long a resident of Edgewood and Bel Air, Md., and now resides in Washington, D. C., where he moved in 1935.

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Yokohama M69 Day

By CAPT. KENNETH D. STRUVE, *CmlC*

As Chemical Officer in Japan I have come to the conclusion that the 29 May 1945 day bombing of Yokohama might well have been called "M69 Day." Yokohama as well as many other large Japanese cities was destroyed by fires originating from Chemical Warfare Service bombs, a large percentage of which were the M69 type incendiary. Strangely enough, this fact is little known even within the armed forces here in Japan. Most soldiers assume that all munitions are Ordnance supplies.

The major damage to Yokohama was caused by a single raid. The story of this raid, often referred to by American newspapers as the "saturation raid" and told to me by Japanese upon many occasions, has been termed the greatest catastrophe in the history of that city.

Located on the east coast of central Honshu, Yokohama is one of Japan's largest cities and the foremost of her deep water ports. It is approached from the Pacific Ocean through Sagami Bay and the Uraga Channel into Tokyo Bay. Here, under the watchful eye of Mt. Fujiyama lies Tokyo, Yokohama and the former great Japanese naval base of Yokosuka, as close together as New York, Jersey City and Newark, N. J.

When Commodore Perry explored Japan in 1854, Yokohama was a small fishing village with the area that was to become the downtown section a salt marsh. Along the southern fringe of the city is a high bluff and it was along this bluff that the foreigners chose to take up residence. This strip of high ground remained the Foreign Settlement until the city was burned out by fires started from B-29 bombings with CWS incendiaries in 1945.

Because of its strategic location with easy access to the Pacific, Yokohama prospered. Its swamps were filled, roads and houses built, and gradually a great city arose from the sea. On 1 September 1923, fire, in the wake of an earthquake, reduced large portions of the city to ashes. Rehabilitation was swift and this time Yokohama boasted many improvements. Many modern buildings were constructed. Wider and better roads, together with a fine network of canals, facilitated transportation. Excellent harbors were an added feature.

Along with the preparations of war, Japan attempted a decentralization of industry. Each home and factory was assigned a definite part in the war effort. As a result of this policy military targets could be bombed almost at random. Nevertheless, the Army Air Force demonstrated its capacity for precision bombing in a manner to be pointed out later.

This, then, was Yokohama in April 1942, when Japan received its first taste of American fire bombs. When the Doolittle surprise attack was made, the CWS contribution to the mission was a thermite-filled incendiary of small (4 lb.) size which resulted in the raid becoming known as the "token" raid. A token of things to come—the now famous M69 six-pound gel-filled incendiary.

That the M69 destroyed Yokohama, no one will deny. Early in May 1945 several heavy night raids were made on Tokyo and on the industrial areas adjoining it on the south. While Yokohama received a goodly number of bombs, it was not the primary target of the AAF at that time. M69 day for Yokohama came on the 29th day of May 1945. Almost a thousand B-29's flew over the city and for three hours literally plastered it with fire. The sight must have been awesome even for the Air Force veterans, and to the Japanese who remained in the vicinity it must have been a catastrophe of a magnitude never imagined possible by them.

The next day Yokohama was a mass of smouldering ashes. Ninety (90) percent of the city was burned out. Japan has often been described as a land with paper cities that would burn like tinder boxes upon a small application of incendiary bombing. Maj. Gen. Leslie Groves has been quoted as saying that nine out of ten Japanese cities are no more vulnerable to fire than the average American city. Certainly, with its vast network of canals, Yokohama had more natural resistance to fire than most American cities. Its homes were constructed generally in the same manner as most American homes—of wood, brick or stucco. Its commercial buildings were almost all of concrete construction. It must be concluded that it was the efficiency of the M69 bombs that caused Yokohama to burn rather than the paper city myth.

Upon my arrival in Yokohama the first week in September 1945, I determined to observe all possible damage that could be attributed to incendiary bombing. On the corner of what had been Yokohama's busiest intersection were several thousand M69 cases. Later the cases were neatly stacked up and made a pile 12 feet high.

one case deep and nearly 30 feet long. These had been collected from the ruins in that block—each of the other blocks were the same.

Today, more than a year later, though a large portion of the ruined area has been cleared of debris by our Engineer units, the cases may still be seen in large numbers. It was my pleasure to conduct Col. G. Marshall and Lt. Col. John Fitzpatrick of General MacArthur's staff through certain portions of Yokohama where the bombs may still be seen as they landed, untouched since then. I am happy to say that as a result of this tour moving pictures were taken for inclusion in CWS archives.

Regarding the functional efficiency of the M69, I have only the highest praise. The percentage of duds appeared to be very low. Of all the cases examined, only three were unexploded. These duds apparently had landed on concrete at a very low angle and the impact had crimped the nose of the bomb around the fuse. Careful observation led me to believe that all bombs landing on concrete or other hard surfaces suffered crimping of the nose, which did not impair their efficiency. Those landing on the ground suffered no damage whatsoever.

The density of bombing was evident from the markings on impact of hard surfaces. The residential and semi-commercial sections were burned out completely. The heavy commercial and industrial district was hit the hardest and it proved possible to collect some interesting statistics. To illustrate: A burned-out building was found that had a flat concrete roof in good condition. Climbing to the top, it was found that the roof still retained a number of bomb cases and the permanent indentation made by their impact. The roof itself was made of reinforced concrete four inches thick and covered by foot-square concrete tiles, also reinforced and about a half inch thick. They were bound together by about three-quarters of an inch of heavy tarry substance. The roof measured 33 x 72 feet. On it, plainly visible, were 34 separate impact marks—about one to each square yard. On the surface just described the six-pound bombs had penetrated on the average of a half inch. Allowing for the relatively slow fall of this type bomb, it seems obvious that the bombing had been done from a low level, possibly about 5,000 feet. Many of the cases were well enough preserved to permit reading of the nomenclature markings on them.

Of other types of incendiary bombs I could find no tangible evidence. A number of Japanese described a larger bomb to me in cases, but due to the language difficulties and lack of pieces of the bombs I could not be sure if they were referring to unopened clusters, M47's, or jettisonable tanks. I did find several cluster frames which appeared to be of the variety which holds 60 bombs. However, my identification of the cluster frames was not positive. One English-speaking Japanese girl told me of the bomb which hit her house. She also drew a pencil sketch of it for me and from the looks of it and what it did to her house it appears to have been the 100-pound incendiary bomb.

Reconstructing the evidence of the damage resulting from incendiary bombing raids, I offer the following: The bombs impact on the roof of, or around the building. Roof penetration is negligible due to the slow rate of fall of the bombs and the concrete construction of most of the roofs. The bombs then scatter burning gel, which clings tenaciously to whatever it hits, thereby starting many small fires. Direct hits of the main mass of gel from the bomb will smash plate glass and thereby start fires inside the building immediately. Usually exterior combustible objects burn readily and the heat generated builds up until plaster cracks and falls away from the lath work.

Rehabilitation of Yokohama was prompt. However, half of it is one great shanty-town built from any salvage that could be used. The rest is composed of those few buildings that have survived or been reconditioned, and innumerable Quonset huts. On the streets may be seen various army vehicles, Japanese charcoal-burning midget cars, trucks and three-wheel motorcycles, and last but not least, the Japanese version of the famous Toonerville Trolley. Life goes on as usual for the Japanese. He seems more or less contented with his lot. Certainly he is glad that he is not being bombed any longer.

U.S. Chemical Power Feared by Japs

(The following article, reproduced from the Nippon Times, was forwarded to The Journal by Col. Geoffrey Marshall, Chief Chemical Officer, U. S. Army Forces, Pacific.)

The Japanese general staff's fear of America's superior productive capacity and thorough preparation for gas warfare, if it came, effectually prevented Japan from initiating chemical warfare in World War II, GHQ authorities said July 12.

The disclosure of Japan's dread of America's power in chemical warfare followed the completion of a six volume report on Japanese chemical warfare by Col. Geoffrey Marshall, chief chemical officer of AFPAC. The report covers the Japanese empire's organization for chemical warfare, research, manufacturing, arsenals, plants, chemical weapons and equipment.

The conclusion reached through the investigations is that the Japanese were ill prepared for modern, large-scale sustained chemical warfare, either defensive or offensive.

The Japanese fully understood the immense superiority of American productive capacity and, as an island empire, their vulnerability to air attack. *The Japanese armed forces, both army and navy, the report states, were severly handicapped in that there was not a separate chemical service in their military organization.*

The army and navy carried out development and manufacturing independent of each other, with very little liaison between them. *The army initiated chemical warfare research in 1919, and by 1925 chemical warfare was recognized as a weapon.*

The production methods in general use by the Japanese, according to the report, were as advanced as in the United States. Both the army and navy carried out extensive work in the search for new agents, but only the common agents were produced. Virtually no new developments were made.

The report tells that the Japanese army in 1944, fearing that Germany would in desperation resort to gas, recalled all stocks of gas munitions in the field from the hands of troops to rear echelon depots. The Japanese reasoned, the report points out, that if the Germans used gas, the Allies might retaliate against Japan as well. Recalling of the gas, they hoped, would lessen the possibility of the Allies using gas against them.

The Japanese also took no chances against irresponsible use by isolated units in desperate situations which might provoke full scale retaliation, according to the report.

"The Japanese were even prepared to overlook small scale tactical use by the Allies to avoid general gas warfare," writes Marshall.

The report states that as the Japanese lost the initiative and it became apparent that the American forces possessed the ability to regain their lost territory and, in addition, attack the homeland, they concluded that the initiation of chemical warfare would be disastrous. "By mid-1944," Marshall writes, "the decision was definitely made to avoid gas warfare, if at all possible."

Japanese research and development work in chemical warfare resulted in failure, the study disclosed.

The survey of Japan's chemical warfare potential was an extensive one. It included installations, factories, equipment, munitions, and the examination of hundreds of Japanese technicians and officials. Work on the report had been under way ever since the surrender.

The report states that the Japanese apparently failed to realize the importance of incendiary munitions until after they had felt the weight of our incendiary attacks, and that their development of incendiary munitions was far behind that of our own and the other major Allied and Axis powers.

CHEMICAL CORPS OFFICER AWARDED O.B.E.

Lt. Col. Berrien Eaton, CmlC., inactive, President of Eaton-Clark Company, Detroit, was recently decorated by the British government. He received the British decoration of O.B.E., Honorary Officer of the Order of the British Empire (Civil). This award was made in recognition of his services to the British Empire as Chairman of the Michigan Committee of the British War Relief Society during 1940 and 1941, before he entered active duty on 8 March 1942 in the Office, Chief Chemical Corps.

While on active duty, Col. Eaton was stationed for one year at Camp Detrick, and then returned to the Chief's office in May 1944, where he served in the capacity of Executive Officer, Special Projects Division. He went on terminal leave on 8 September 1945 and returned to his offices in Detroit. Col. Eaton was one of the first charter members of the Chemical Corps Association.

San Jose Project

The following excellent article acquires a historical value in view of the fact that the Republic of Panama has declined to renew the treaty under which the San Jose Island was leased by the Chemical Corps. Progress has already been made toward evacuating the establishment, and General Waitt has gone to Panama to expedite the move, and at the same time to attempt to locate a new and suitable location for the project.

By CAPT. JAY S. STOCKHARDT, *CmlC*

In July 1943 the Chief of Staff requested that the theaters be prepared for heavy and prompt retaliation against the Japanese if they continued attacks with toxic chemicals against the Chinese. At that time there was insufficient data available on the behavior of chemical agents, weapons and munitions under jungle conditions. On 20 August 1943 a request was made by Maj. Gen. William N. Porter, Chief of the Chemical Warfare Service, to the Chief of Staff for the establishment of a field testing station for tropical experimentation. The request was granted and resulted in the selection of San Jose Island, which was leased in December 1943 from the Panama government at a nominal yearly rental.

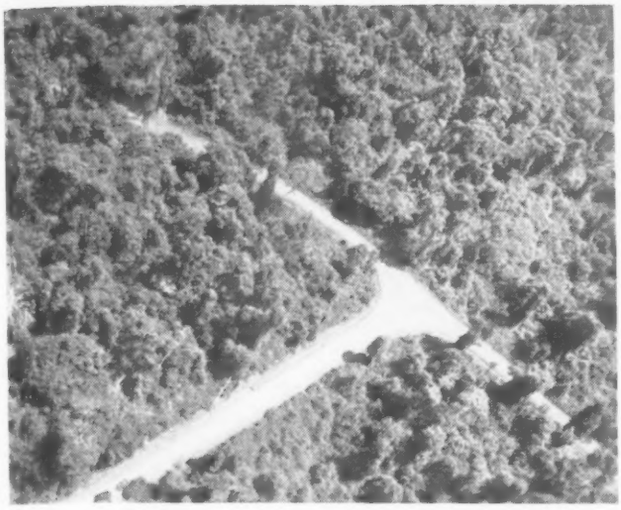
San Jose Island is the second largest of the Archipelago de las Perlas and is located approximately 60 miles south-southeast of Panama City in the Gulf of Panama. These islands have been known since the days of the conquistadors and buccaneers, the waters adjacent serving as a rendezvous point for buccaneer fleets that raided the gold caravans headed from Peru to Panama. It is fairly well established that they have been visited by all of the well-known raiders of early history. There is some evidence that these adventurers used San Jose Island to careen their ships and to replenish their water supply.

Two others of the Perlas Islands have long been inhabited, probably at first by runaway slaves from the mainland. Now about 16 of the Perlas Islands are inhabited. There is no evidence that San Jose Island, however, recently had a native population. Among the natives of the other islands, San Jose bears the reputation of being haunted. Local legend has it that some decades ago an English family settled here to farm but after some dispute with the natives of one of the adjoining islands this island was raided and the English family wiped out except one man whose chin was cut off and who continued to live around Panama City until after the turn of the century. Returning from the raid, one of the native chieftains tripped over a sharp tree stump and was impaled. The native mind seems to have seized on this as a manifestation of the murdered men's ghosts returning for revenge. This happened about 1900. It is known that no natives had ever stayed overnight on San Jose Island from that time on. There was, therefore, no native population which had to be displaced when the Army took over early in 1944.

View near main beach

San Jose Island is 7 miles long, 3 miles wide, and is largely covered with jungle. The coast line is very irregular for the most part, rising steeply from the sea as rocky bluffs 30 to 50 feet high. There are also numerous sand beaches, one almost two miles long. The interior is gently rolling with an average elevation between 100 and 200 feet, the highest hills being around 450 feet. There are no lakes or ponds and the very few streams which flow throughout the year arise as springs. The climate of the island is typically tropical, with a rainy season from May through December and a dry season from January through April. The average rainfall is approximately 90 inches.

A couple of popular misconceptions of tropical climate and its rainy season might be explained away here. The temperature at San Jose Island ranges between a minimum of 65° to a maximum of 95° with the normal temperature during the



Aerial view showing jungle and road

day in the low 80's. While approximately 90 inches of rain fall on this island annually, during the 7-month rainy season it does not rain continuously or even every day. In 1946, the last complete year, there were 86 days in which no rain fell during the rainy season.

In addition to the normal tropical flora and fauna, San Jose Island has several interesting naturalistic aspects. It is practically totally free from mosquitoes. There are no poisonous snakes found on the island and wild life is not abundant and generally small in size. Elsewhere in the Central and South American regions boa constrictors, for instance, run up to 30 feet in length. Here the largest ever seen was approximately 10 feet in length. The most notable feature of the animal life of San Jose is a herd of miniature deer which range over the island. These stand only 24 to 30 inches at the shoulder when full grown. Extensive studies have been made of the flora and fauna of this island by Dr. Johnston of Harvard University, Dr. Wetmore of the Smithsonian Institution, and others. A reference list of the Smithsonian Institution publications on the island is appended.

There have been found on this island several hitherto unknown plants. Some of these, after classification, have been named for commanding officers and technical directors of this station. General Bullene, Lt. Colonel Thompson and Major Campbell, all formerly of this station, have been so honored. Even today there remains one plant whose identity has not been established.

The accompanying pictures show a few scenes about the post and some typical scenes in the jungle. Nontypically there are isolated specimens of very large trees. Notably there are giant fig trees standing 75 feet high, a cashew tree some 20 feet in diameter, and cedrillos (cigar box cedar) 6 and 8 feet in diameter. There is also one specimen of strangler fig, the main group of whose growth is 20 to 25 feet across and whose tentacles spread out for 50 to 100 yards in every direction from the center.

The facilities, other than technical, are those usually associated with a small post. There is a 16-bed hospital, an administration building, a P.X., theater, library, Officers' and NCO Clubs, officers' mess, barracks and EM mess, B.O.Q. and several apartments for married officers and enlisted men. All buildings are frame, screened and with louvered windows. A Diesel power plant provides 120-volt, 60-cycle alternating current. Water is obtained from wells by pumping. Water and sewage lines connect all main buildings. A telephone system is installed. There is radio and radio telephone communication with a Contact and Procurement Office at Albrook Field, C. Z.

Medium jungle canopy

Dense jungle showing overhead foliage

The Technical Branch has six laboratories housed in separate buildings as follows:

1. Instrument Repair
2. Chem Lab for Persistent Agents
3. Chem Lab for Nonpersistent Agents
4. Photographic Lab
5. Graphic Arts
6. Range and Safety

The equipment is the ordinary equipment for such work. In another building is located a small technical library, a Technical HQ office, Meteorology Section and a conference hall seating 40 persons.

Centrally located with respect to the test areas is a regular decontamination station equipped with shower baths, decontaminants, clothing, towels, etc., for use during field tests. There is also a storage area where all munitions are stored and surveillance tests carried out. Three meteorological stations are maintained, one central jungle station and two hilltop stations at opposite ends of the island.

Areas representing various types of jungle are laid out for experimental purposes. Access roads, jeep trails and foot trails have been cut through. In addition to the land facilities, the waters adjacent are used for experiments involving landing craft, beach operations and the like. Some extensive tests have been made in cooperation with the Navy. It is thus possible on a control basis to study the behavior of weapons, munitions and agents against any type of tropical growth or condition likely to be encountered.

The general functions of San Jose Project are:

1. To gather technical data on the behavior of lethal chemical agents in tropical jungles.

2. To test chemical munitions in order to ascertain their effectiveness under jungle conditions.

Medium thicket area

3. To develop doctrines for the most efficient jungle employment of lethal chemical agents.

4. To translate the data obtained into operation instructions for using arms and services.

5. To carry out field testing of chemical warfare materiel as directed by the Chief, Chemical Corps.

In addition to the general functions for the Chemical Corps, San Jose Project is prepared to carry on tropical testing and surveillance work for other arms and services.

All operations on San Jose Island, with the exception of maintenance, are carried on by military personnel. The present authorized complement consists of 25 officers and 185 enlisted men. About one-quarter of these are in the Technical Branch.

Since mid-1944 approximately 130 field tests have been performed on San Jose. The present schedule calls for one field test every week, in

Medium tree canopy

Low thicket area

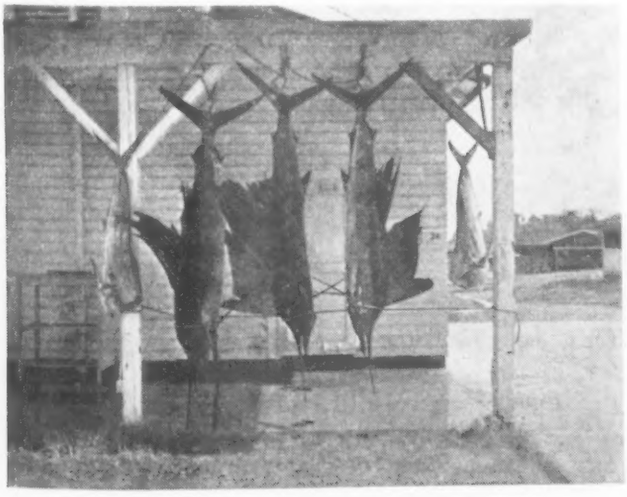
Bald Hill and jungle

addition to surveillance and similar tests which are carried on continuously. Every effort is made to accentuate the tropical feature of these tests as the one unique feature of this proving ground is its tropical location.

No article about San Jose Island would be even moderately complete without mention of the fishing. The waters around the island abound in tropical game fish. These waters have been counted among the finest marlin and sail fishing grounds anywhere. Fishing is the principal recreation for all. Every weekend sees at least two or three large parties trying their luck and never do San Jose fishermen return empty-handed.

Reference List—Smithsonian Institute Publications

Publication	Title	By
3845	The Birds of San Jose and Pedro Gonzalez Islands, Republic of Panama	Alexander Wetmore
3846	The Vegetation of San Jose Island, Republic of Panama	C. O. Erlanson
3847	A List of Fresh-Water Fishes From San Jose Island, Pearl Islands, Panama	Samuel F. Hildebrand
3848	Notes on the Herpetology of Pearl Islands, Panama	Doris M. Cochran
3849	Echinoderms From Pearl Islands, Bay of Panama, With a Revision of Pacific Species of Genus Encope	Austin H. Clark
3850	The Nonmarine Mollusks of San Jose Island, With Notes on Those of Pedro Gonzalez Island, Pearl Island, Panama	J. P. E. Morrison
3851	Mammals of San Jose Island, Bay of Panama	Remington Kellogg



Sailfish and dolphin caught off San Jose

SAN JOSE CHEMICAL TEAM PARTICIPATES IN ANNUAL SAILFISH AND BLACK MARLIN TOURNAMENT

By LOWELL A. ELLIOTT
Colonel, CmlC
Commanding Officer, San Jose Project

The Pacific Sailfish Club of Balboa, Canal Zone, was host at the Second Annual Sailfish and Black Marlin Tournament in Panama Bay, August 28-30. The San Jose Chemical Corps team accepted the invitation extended by the Commanding General, Panama Canal Department, to Service teams and participated with considerable success.

Envied members of the San Jose Chemical Corps team were T/4 Frederick S. Wegmer, S/Sgt. Charles O. Wallis and T/3 LaVerne B. Ellis.

Strictly professional tackle, which consisted of light rods and 9-thread line, was used by the Chemical team, and their total catch was the largest of the Service teams using regulation tackle. This is quite a feat since considerable skill is required to land such a large game fish with light thread of this kind.

On the first day of the contest, Sgt. Wegmer led the individual contestants with a 126-pound sailfish and continued to hold his lead on the second day, but was nosed out on the final day by the winner, who boated a fish weighing two pounds more.

Sgt. Wallis gained top honors for our team when he broke a world's record for wahoo caught with light tackle. He landed a 66½-pound fish on a 9-thread line.

The record of the members of the San Jose team is especially outstanding when it is considered that these soldiers had no previous experience in tournament competition and were competing against the world's finest fishermen.

Prewar and Wartime Development of Protective Materiel

By S. H. KATZ
Chemical Corps Technical Command
Edgewood Arsenal, Md.

Introduction

During the recent war the number of scientific investigators engaged in research to find new materials for protecting against chemical agents, and working to develop protective materiel, was greatly expanded from the small nucleus of less than two dozen persons of all grades who composed the Protective Division of the Chemical Corps Technical Command throughout a long period prior to the war. The prewar field of endeavor was just as broad as the field during the war when the work was highly intensified by augmenting the funds and by subdivision among numerous organizations and groups with a total of resources and personnel a great many times that of the prewar Protective Division. In addition to the work of development the small prewar staff had the responsibility for and accomplished a large amount of testing of materiel for acceptance in accordance with specifications, especially gas mask canisters and faceblanks; they maintained the Edgewood Arsenal stock of protective clothing, issued it for use as needed, received and renovated it after use, and maintained accurate records of every item in stock or in use. During the war prominent parts were taken by the CWS Development Laboratory at the Massachusetts Institute of Technology and the group under Division 10 of the National Defense Research Committee at Northwestern University; research contracts were placed with many industrial and consulting laboratories, and with universities, such as the United Shoe Machinery Company, Arthur D. Little, Inc., E. I. du Pont de Nemours & Company, Princeton University, University of Rochester, Slatersville Finishing Company, Milton Harris Associates, Dennison Paper Company, C. H. Dexter & Sons, Inc., National Carbon Company and numerous other organizations.

This paper reviews the principal items of protective materiel supplied to the U. S. Army during the war, and some related items, and mentions briefly the principal organizations concerned with their development. It is not intended to disparage the efforts or accomplishments of any organizations or persons who were engaged in the war effort. The results were ample to bestow credit on all groups, of which only a few are mentioned herein, particularly since the groups cooperated freely in the wartime work. It is, however, a tribute to the Protective Division. Others surely could write similarly on the accomplishments of others. The items of materiel mentioned hereafter do not comprise a complete list; but a considerable majority of the items are mentioned, enough to give a comprehensive view.

Figure 1—Service Gas Mask M2A2-9A2 IVAL; available in large numbers during the recent war.

Gas Masks

Service Gas Mask. The service gas mask with a fully molded facepiece, or large canister, and an under-arm carrier is a prewar development made under the Protective Division. The prewar service canister MIXA1 was improved in wartime by using a superior impregnated charcoal for filling, developed mainly under the NDRC, and by using the modern filter materials to make the superseding M9A2 canister. The new filter materials were developed by a group of organizations mentioned hereafter. These canisters have greater gas capacity and lower breathing

Figure 2—Combat Service Gas Mask M5-11-7 with Outlet Valve C15; relatively few were manufactured prior to VJ-Day.

resistance than the more recent types and are still in use. But the recent masks are lighter in weight and less bulky; they are preferred by the using services because the lesser burden of carrying them and the convenience of smaller bulk are favored more than the greater gas capacity.

Lightweight Service Gas Mask. This prewar development of the Protective Division was manufactured and issued in far greater numbers than any other gas mask just prior to and during the war; and it comprises a greater portion of the gas masks currently available. Wartime improvements in the canister to produce the M10A1 were made possible by replacing the prewar granular filling and filter material with superior impregnated charcoal and gauze-backed filter material developed during the war.

Combat Service Gas Mask. The combat mask is a wartime development of the CWS Development Laboratory. Development has been essentially completed and the mask was standardized. Limited production was accomplished during the war but defects appeared in the small, lightweight, cheek-mounted canisters which frequently did not meet the specification requirements for rough handling. Improvements are needed. The canister filling deteriorates more rapidly under tropical conditions than similar filling in the larger canisters. This should introduce no general hazard because new canisters can readily replace the used ones held on a threaded canister-mounting piece.

The facepiece with the cheek-mounted canister eliminates the hose of the prior masks made for service use. The combat carrier is watertight, a unique feature which gives protection to the canister against spoilage by entrance of liquid water during the vicissitudes of service. The combat mask is the lightest and most compact of any in service use.

Diaphragm Gas Mask. The diaphragm gas mask is a prewar development. It was destandardized and eliminated from service use during the war, but its use as a training gas mask is continuing.

Diaphragm Optical Gas Mask. This is a prewar development but only the universal size of the optical facepiece M2 was developed prior to the war. The large and small sizes of facepieces for the optical masks were mostly developed at the CWS Development Laboratory. This development is continuing in the Protective Division.

Training Gas Mask. This is a prewar development of the Protective Division.

Noncombatant Gas Mask. This is a prewar Protective Division development. However, an improved facepiece of fully molded and impregnated felt was developed at the CWS Development Laboratory to replace the prior ones made of impermeable sheet materials. The felt faceblanks could be produced fairly inexpensively by the felt hat industry and the fully molded structure made better-fitting facepieces. The fully molded felt facepieces were not developed in time for inclusion in the manufacturing program so only the noncombatant masks, with facepieces made of flat impermeable materials were produced.

Headwound Gas Mask. This development was initiated in the Protective Division but was largely accomplished by the CWS Development Laboratory through development and standardizing of the mask finally manufactured.

Aviation Gas Mask. Several models were developed by the Protective Division although none has been acceptable to the Army Air Forces. It was finally decided that an aviation gas mask was unnecessary and development was discontinued.

Infant Protector. This was developed by the Protective Division.

Horse Gas Mask. The standard horse gas masks M4 and M5 were developed by the Protective Division.

Dog Gas Mask. This was developed by the Protective Division.

Gas Mask Components. Some minor components of gas masks were especially developed recently for use in current types of gas masks. Those mentioned below have improved the performance or durability considerably.

Outlet Valve C15. This valve with a diecast metal case replaces the outlet valve M8 with a plastic case and gives better performance and durability. The C15 was developed by the CWS Development Laboratory; all the prior outlet valves on standard gas masks were developed in the Protective Division.

Diaphragm Angletube E11. This angletube has a body of diecast metal. It replaces those of molded plastic which were subject to warpage. The outlet valve on the E11 shows lower leakage and resistance than those on prior angletubes. The E11 was developed at the CWS Development Laboratory; all prior angletubes were developed in the Protective Division.

Modern Impregnated Charcoal. This absorbent now used in all canisters manufactured for military service in the U. S. Army was developed under the NDRC Division 10 by the group at Northwestern University. It affords superior protection against certain gases and protects even when the canisters are humidified. Earlier types of impregnated charcoal had less capacity for protecting against particular gases.

Gauzebacked Filter Material. This material used in multilayer smoke filters in lightweight canisters is much more rugged and more efficacious than prior types. It was developed mostly by the NDRC and the CWS Development Laboratory, A. D. Little, Inc., and C. H. Dexter & Sons, Inc., the two latter companies working under research contracts.

Figure 4—Decontaminating apparatus M3A1; with crew wearing impermeable protective clothing.

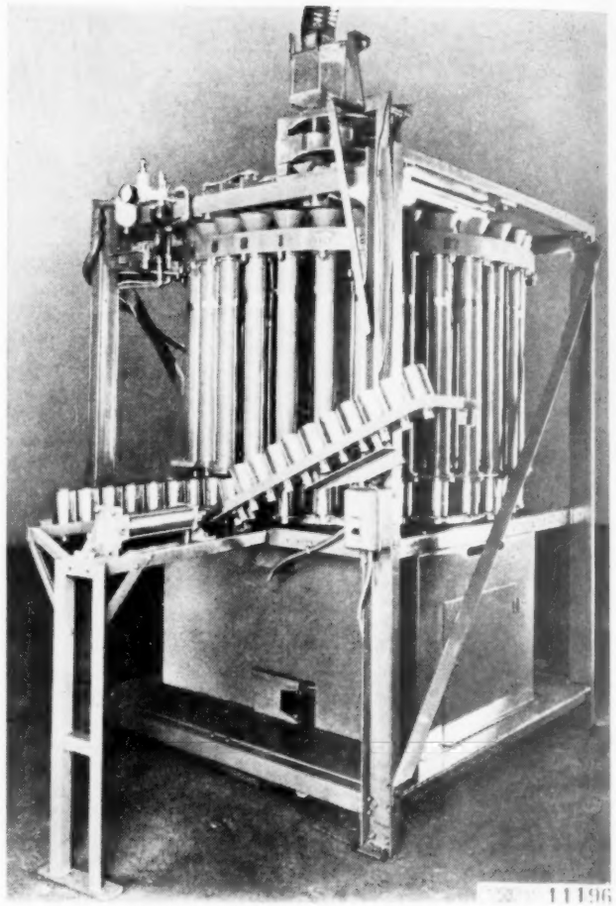


Figure 3—Filling Machine E11; fills charcoal into chemical containers of canisters arranged for radial air-flow through purifiers.

Pleated Filters. The pleated filters used in combat canisters M11 are of two types, circularly pleated and shell pleated; the former is an adaption of the filters used in German military canisters, the design of the latter is new. Circularly pleated filters for the American canisters were developed by the CWS Development Laboratory. Machines for building them were developed on a research contract with the United Shoe Machinery Co. The shell-pleated filters were developed by the CWS Development Laboratory with the collaboration of the Dennison Manufacturing Co., through a research contract. The pleated filters do not contribute to the rough-handling failures of combat canisters M11 mentioned above.

Manufacturing Equipment. Many special machines or manufacturing appliances for gas mask production have been required. When the equipment could not be obtained readily from commercial sources it was developed by the Chemical Corps. Some important items are mentioned hereunder.

Faceblank Molds. Molds for faceblanks produced prior to the war were continued in production use during the war. The first molds

Figure 5—Horse Gas Masks M4; worn by horses pulling a caisson.

made served as patterns for manufacturing subsequent ones. The first molds were developed by the Protective Division with the collaboration of rubber manufacturers or mold manufacturers generally governed by research contracts. During the war the newer molds were developed similarly by the CWS Development Laboratory. Development of some molds was incomplete at the end of the war and the work is being continued in the Protective Division.

Canister Filling Machines. All the machines in prior or current use in manufacturing, excepting one type, were developed by the Protective Division. The exception is a can filling machine made for the food industries and adapted by the manufacturer for filling gas mask canisters; its performance is poorer than that of machines developed by the Chemical Corps.

Filter Wrapping Machines. The machines for wrapping filter material on chemical containers for canisters arranged for radial flow were developed by the Protective Division.

Testing Apparatus. Some special apparatus for testing canisters, granular absorbents or filters required extensive study and development. The work on improvements has been continuous and various groups made contributions. This work is not spectacular but it promoted improvements and uniformly high quality in the gas masks as greater sensitivity, accuracy, rapidity and reliability of testing was contributed by better methods and equipment.

The "Breather." This apparatus tests canisters against gases or vapors with intermittently flowing air and admixed gas or vapors, simulating breathing. The current model is based on machines first made under the NDRC by the group at Northwestern University. In subsequent development, the CWS Development Laboratory and the Protective Division collaborated with the NDRC. Drawings for the final design were made through collaboration of the Engineering Division and the Protective Division.

Continuous Flow Apparatus. This apparatus tests canisters against gases in air flowing at uniform rates. It was developed by the Protective Division.

Liquid-Smoke Penetration Meter. This apparatus was developed by the CWS Development Laboratory with the final collaboration of the A. B. Du Mont Laboratories, Inc. It rapidly tests filters in canisters on the production line through a photoelectric process.

Methylene Blue Penetration Meter. This apparatus tests canisters or filter material for efficacy in restraining smoke composed of solid particles. It is much less rapid and less sensitive than the liquid-smoke penetration meter. The MB penetration meter used in the Chemical Corps was developed by the Protective Division following principles embodied in an English MB penetration meter.

Collective Protectors

Collective Protector, MI. The modifications of this collective protector are the current standard items for protecting plotting rooms or other enclosed spaces needing a permanent installation. They were developed in the Protective Division. The MI and the two types mentioned next below, M2 and M3, or their modifications, were manufactured in considerable numbers prior to and during the war.

Large Field Collective Protector, M2. This, and its modifications, were developed in the Protective Division.

Small Field Collective Protector, M3. This was developed in the Protective Division.

Field Collective Protector, MIT-E9R1. This is a more compact model and lighter in weight than the standard M2. It was partially developed at the CWS Development Laboratory. The development is being completed by the Protective Division.

Facepiece Protector, E21R3. This was developed at the CWS Development Laboratory to protect members of tank crews. It has not been standardized because provision has not been made to protect persons when they must leave the tanks. The present major development was accomplished at the CWS Development Laboratory. The additional development needed is being done by the Protective Division.

Six-Man Hospital Gas Protector. This was a development of the CWS Development Laboratory. It consists of the air blower and purifying apparatus of the facepiece protector combined with the facepiece of the headwound gas mask.

Protective Clothing

Permeable Protective Clothing. All items from socks to hood, from underwear to outerwear, were developed by the Protective Division. The Philadelphia Quartermaster Depot collaborated in the design. The equipment for chemical-plant treatment of the clothing was developed into the pilot plant stage by the Protective Division; the additional plant development was the work of the Plants Division.

Impermeable Protective Clothing. All the underclothing is identical with that worn with the permeable protective clothing mentioned in the preceding paragraph. The impermeable one-piece outer garment was developed by the Protective Division. The Philadelphia Quartermaster Depot collaborated in the design.

Impermeable Fabrics. The currently specified lightweight impermeable material for use in the manufacture of impermeable protective suits and various types of impermeable covers for materiel was developed by the CWS Development Laboratory with the collaboration of manufacturers of coated fabrics. Development of a source of butyl rubber enabled the manufacture of the present very superior impermeable material. Prior types of impermeables were developed by the Protective Division mainly by selection, adaptation and specifying of materials made in industry.

Shoe Impregnite. This was developed by the Protective Division.

Testing Apparatus. The apparatus most generally used for laboratory testing of the gas protection afforded by permeable and impermeable protective fabrics were developed by the Protective Division.

Decontaminating Equipment

Agents. The various decontaminating agents standardized now as M1, M3 and M4 and comprising bleaching powders and chloramines were developed by the Protective Division.

Apparatus. The standard decontaminating apparatus comprising the M1, M2, M3, M3A1, M3A2 and M4 with capacities of 3 gallons, 1½ quarts and 300 gallons or 400 gallons, were developed by the Protective Division with the collaboration of commercial manufacturers. The M3A2 is a chassis-mounted apparatus with a power take-off for spraying the decontaminating agent, but it may be used also to haul water, and it includes showers for the concurrent bathing of eight men.

Figure 6—Dog Gas Mask M6-12-8; on a military dog.

Miscellaneous Items

Numerous miscellaneous items for use in manufacturing plants or in the field have been needed. Some of these are mentioned below:

Rubber substitutes.
Special gas masks.
Gas mask repair kits.
Unit containers for storage of gas masks.
Waterproofing kits for gas masks.
Auxiliary canisters.
Canister resistance meters.
Rough handling machines for canisters.
Dust respirators.
Eye shields.
Pigeon protectors.
Testing kit for permeable protective clothing.
Filling and wrapping machines for air purifiers for collective protector canisters.
Dehumidifying apparatus for collective protector canisters.
Hand tools for special purposes.
Wooden box stretcher (acting by springing nails laterally).
Directives for manufacturing processes.

The CWS Development Laboratory or the Protective Division developed nearly all of the miscellaneous items required during the war. Some, which were produced prior to the war, were developed by the Protective Division.

Reappraisal

As previously stated all of the organizations contributing to the development of the equipment

for protecting the American soldier against chemical warfare agents achieved very creditable results. None had a broader field than the small group in the Protective Division prior to the war. The Protective Division operated during the war with some reduction in the scope of its activities, as gas mask and collective protector development and the work on impermeable materials were transferred to the CWS Development Laboratory during the greater part of the war period. All the work on developing gas protective equipment is again centered in the Protective Division of the Chemical Corps Technical Command, again reduced to a small force although a few more members are retained than those comprising the prewar staff. Some research contracts with universities and industrial organizations are now established and these will promote future improvements in protective materiel.

Evidence has shown that the excellence of the protective equipment, as well as the offensive materiel that was available to the Allies, contributed in no small measure to the reluctance of the enemy nations to initiate the use of gas warfare, which they would have done if they had had superiority in defensive and offensive equipment. The Protective Division contributed a fair share in winning the chemical war, "without firing a shot," as it was expressed by Major General Waitt. Their contribution viewed as quantity per man-year, or on the basis of cost, or quality, is commendable.

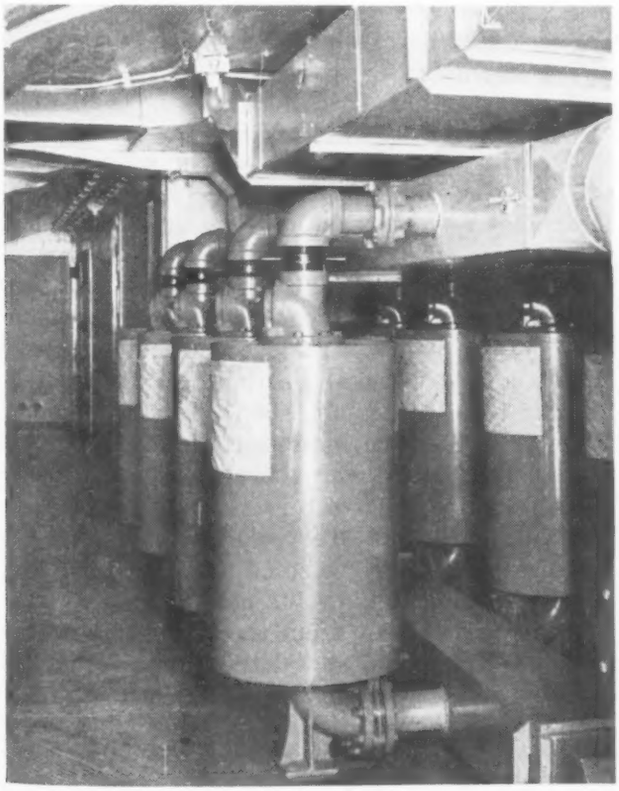


Figure 7—Collective protector installation in a fortification; with collective protector canisters M1 arranged in multiple.

POLYOXYETHYLENE

Commercial production of a long line of products extending practically throughout the entire range of polyoxyethylene (long chain ether alcohol) fatty esters has been begun by Glyco Products Company, Inc., of Brooklyn, N. Y., and Natrium, W. Va., it is announced by Dr. Eugene McCauliff, technical sales director of Glyco.

Expansion in the range of these esters manufactured by the company, which for many years has been an important producer of the lower members of the polyhydric alcohol fatty acid esters, was undertaken, according to Dr. McCauliff, because of the ever-increasing applications being found for them in widely different industries. The long chain, high molecular weight esters exhibit many advantageous properties not found in the lower members.

Ranging from liquids of low freezing point to waxy solids and from water solubility to hydrocarbon solubility, these esters are being applied in the manufacture of emulsions, dry cleaning soaps, cosmetics, pharmaceuticals, lubricants, textiles and plastics.

Members of this non-ionic series of compounds are wetting agents, penetrants and detergents. They are compatible with cationic and anionic surface active agents and, when used in combination with them, give increased wetting and penetrating action at reduced unit cost.

They are used with quarternary ammonium disinfectants to increase detergency. Others are excellent emulsifying agents for hydrocarbons and insecticides, even under the severe conditions of solutions that contain acids and electrolytes.

Also products of this unusual series are lubricants for textiles, rubber and plastics, plasticizers for synthetics and plastics aad spreading and dispersing agents.

The wide range of physical properties achieved by these non-ionic surface active agents results from varying their molecular structure. The variations occur in the polyoxyethylene chain length, in the type of fatty acid used and in their ratios.

Storage of Bleaching Powders*

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Chemical Corps Technical Command
Army Chemical Center, Maryland

Abstract

A number of samples of ordinary, high-test, and special bleaches were stored at 45° C. and 20-85 percent R.H. The storage life, i.e., the time required for 50 percent loss of available chlorine varied from about 2 to 30 weeks, depending on the nature of the bleach. In general, the results of storage tests correlated well with the results of laboratory heating tests, in which the loss of available chlorine on heating for two hours at 100° C. was measured. High-test bleach and certain special types of low-test bleach lasted much longer than ordinary bleaching powder. The decomposition of the various types of bleach during storage resulted in the formation principally of calcium chloride, calcium chlorate, and oxygen.

* * * * *

Bleaching powder has been the primary decontaminating agent for mustard gas and other vesicant or blister gases since World War I. The principal advantages of bleaching powder as a decontaminant are efficiency in neutralizing vesicants, low cost, and availability in large quantities. On the other hand, bleaching powder has a serious disadvantage for use by the Armed Services in that it is inherently unstable. Thus, stocks must be replaced at intervals. In this connection, McDonnell and Hart found in 1926 that the average loss of available chlorine for a number of samples of commercially packed bleaching powder (moisture content 15-20 percent) in a temperate climate was 1.4 percent per month during the hottest months, May to September, and 0.6 percent per month during the coldest months, November to March. (4)

For a short period of time, before our entrance into World War II, high-test bleach, a very stable material, was procured for use as a decontaminating agent in tropical climates. However, because of the high cost and non-availability of high-test bleach in large quantities, as well as its relative inefficiency as a decontaminating agent on the basis of available chlorine content, it was necessary to revert to the use of ordinary or low-test types of bleach during the war. At the present time, the standard material for use in decontaminating operations by the Armed Forces is a bleaching powder meeting the requirements of grade 3, U. S. Army Spec. 97-54-281, 19 July 1945. Grade 3 bleach contains a minimum of 30 percent available chlorine and a maximum of 3 percent free moisture. Work reported herein and in Chemical Corps technical reports (2, 3) showed that grade 3 bleach was much more stable than ordinary bleach, grades B or C, Federal Spec. O-B-441a, which usually contains 6-20 percent moisture. (Note: References 2 and 3 contain detailed data and graphs of the results described herein.)

The primary purpose of this investigation was to determine the relative storage life of various types of bleach at 45° C., which temperature is considered to be about the maximum that will ordinarily be encountered. Another object was to determine if a correlation existed between storage life at 45° C. and the results of laboratory heating tests (loss of available chlorine on heating for two hours at 100° C.).

Terminology

Storage Life—Time required for 50 percent loss of available chlorine during storage.

A discussion of many of the terms used in this report was given in a previous article.(1)

Experimental

A series of tests was first run with samples of ordinary, high-test, and special types of bleaching materials stored in small, shallow, resin-coated metal pans with loosely clamped glass covers at 45° C. and 85 percent R.H. Nine pans of each type of bleach were placed in storage, and one pan was removed permanently each time an analysis was desired. Unfortunately, most of the bleaches absorbed considerable quantities of moisture during storage, in contrast to storage in Chemical Corps bleach drums in which the absorption of moisture is negligible. As a consequence of the absorption of moisture, the life of the bleach in the small pans was relatively short compared to that obtained in drums. However, it was evident from the storage that high calcium hydroxide and low moisture content tended to promote long storage life in ordinary bleach, and that high-test and special types of bleach with low calcium chloride contents lasted much longer than ordinary bleach. It was also found that all types of bleaching materials tested

*Released with the permission of the Chief, Chemical Corps.

tended to give principally calcium chloride and calcium chlorate on decomposition. For methods of analysis, see reference 1.

In this connection, McDonnell and Hart found that with ordinary bleaching powder containing 15-20 percent moisture the available chlorine was transformed during storage in temperate climates largely to chloride chlorine, loss of total chlorine being slight in most cases and the change in chlorate chlorine being minor.(4) Ochi found that dry bleach on heating yielded calcium chloride and oxygen.(5) The presence of water in bleach promoted the formation of chlorate. Urano stated that heat decomposed calcium hypochlorite in the presence of calcium chloride as follows:(6)

I Mainly $Ca(OCl)_2 + CaCl_2 = 2\ CaO + 2\ Cl_2$
II Partly $Ca(OCl)_2 = CaCl_2 + O_2$
III Partly $3\ Ca(OCl)_2 = Ca(ClO_3)_2 + 2\ CaCl_2$

In the present work, the principal reactions taking place were probably II and III.

Another deduction from this small-scale work was that the laboratory heating test which is described in U. S. Army Spec. 97-54-281, 19 July 1945, gives a reliable indication of relative storage life of the various types of bleaching materials. Long storage life was exhibited by those samples which gave low chlorine losses in the heating test. In this test, a sample of the bleach is heated for two hours at 100° C. in a test tube equipped with an air condenser, and the available chlorine content is measured before and after heating. The test is useful for specification purposes and also for studying the effect of various materials on the stability of bleach.

For the next phase of the investigation, bleaching materials were stored in 8-gallon Chemical Corps bleach drums, U. S. Army Spec. 97-54-96, 1 November 1944, at 45° C. and 20-85 percent R.H. These drums have bolted ring closures, and the lids are provided with flowed-in gaskets which permit the release of accumulated gas when the pressure reaches several pounds per square inch. After the release of pressure, the lids close down tightly and no outside air can enter the drum. Sampling of drums was accomplished by means of an iron pipe 1.5 inches in diameter which was hammered diagonally to the bottom of the drums, withdrawn, and the bleach contained therein removed.

In this work, it was desired principally to learn the effect of storage on the various bleaches themselves, not on the containers. Accordingly, drums which became badly corroded or perforated during storage were replaced by new drums. As expected, it was observed that high-moisture bleaches corroded the drums much faster than relatively dry bleaches. For example, chamber bleach containing about 15 percent water produced perforations in the drum during one month's storage at 45° C. and 85 percent R.H.; with grade 3 bleach (3 percent water) two months or more were required under similar conditions to cause comparable damage to the drum. It was considered impractical to place a large number of drums of each type of bleach in storage and remove one drum permanently each time tests were to be made and, therefore in most cases, only one drum of a given type of bleach was placed in storage. However, it was found by comparing test results on frequently sampled drums with duplicate drums, previously unsampled, that frequent sampling had no appreciable effect on storage life.

All bleaches in this surveillance were of the low-test type and included samples approximately equivalent to grades B and C, Fed. Spec. O-B-441a, and grades 2 and 3, U. S. Army Spec. 97-54-281. In addition, a special type of bleach containing approximately 40 percent available chlorine, compared to about 30 percent for the other materials, was tested. This bleach differed from the other low-test materials principally in that it contained an equivalent amount of sodium chloride in place of the approximately 30 percent of calcium chloride present in ordinary low-test bleaches. The special bleach was much more stable than the other materials tested, its storage life being about 30 weeks, compared to about 10-15 weeks for grade 3, four weeks for grade 2, and two weeks for grades B and C. The excellent stability of this material is probably due in part to the elimination of heavy metal impurities in the manufacturing process.

Under the conditions of test, there was no significant absorption of moisture during storage, and low-moisture bleaches tended to last longer than high-moisture bleaches. As was noted in the preliminary small-scale surveillance, the laboratory heating test in U. S. Army Spec. 97-54-281 gave an approximate indication of the storage life of the bleach. In general, bleach giving a low loss of available chlorine on heating tended to have a long storage life, while bleach with high loss on heating had a short storage life.

Analysis of the gas in bleach drums showed that the principal gaseous product of the decomposition of bleach at 45° C. was oxygen, while the solid end-products were principally calcium chloride and calcium chlorate. Gas samples were taken by means of a special sampling device described in reference 3. The first step in the

analysis of the gas consisted of determining total acid constituents, including chlorine, by absorption in potassium hydroxide solution (Orsat apparatus). Next, the oxygen was determined by absorption in ammoniacal copper solution. Hydrogen was next determined by combustion over hot copper oxide and the residue was assumed to be nitrogen. Taking a fresh sample, chlorine was determined by absorbing it in potassium iodide solution and titrating the liberated iodine with thiosulfate solution. Any difference between "total acid" constituents and "total chlorine" may be attributed to the presence of chlorine oxides, carbon dioxide, or hydrogen chloride. As an example of the results obtained, a sample of gas from a drum of ordinary bleach after storage at 45° C. for one month contained 74.0 percent oxygen, 25.7 percent nitrogen, and no chlorine, chlorine oxides, or acidic gases. The nitrogen and part of the oxygen present were due to air in the drums.

In order to devise a small-scale test that gives results similar to those obtained by storage in drums, several samples of bleach were stored at 45° C. and 85 percent R.H. in one-liter glass bottles, closed with rubber stoppers which were fitted with Bunsen valves in order to release gas pressure. As an additional precaution against absorption of moisture, the bottles were placed in a Chemical Corps bleach drum before storage. No moisture was absorbed by these samples, and the storage life was about the same as that obtained by storage in drums. The use of small vented containers thus provides a convenient method of obtaining reliable storage data for bleaching materials.

Acknowledgment

The author is indebted to Mr. Jerome Goldenson and Mr. Cecil Rush of the Chemical Corps Technical Command for the analyses of bleaching powder and bleach gas samples made in connection with work reported herein.

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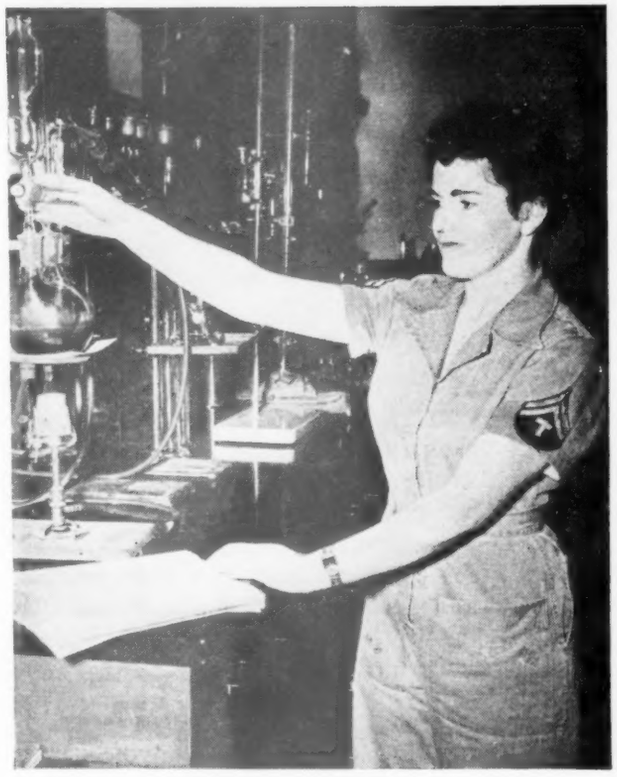
Permanent Status for WAC

The Women's Army Corps, born in the darkest hours of World War II, looks forward now to a future of peacetime service as a part of the Regular Army. Anticipating passage early in the coming Congressional session of legislation creating a Regular Army WAC, together with provision for women in the Regular Navy and Regular Air Force, remaining members of the WAC are busily planning the future of the Corps. All of them are confident that the House of Representatives will pass their long-awaited bill, which was passed by the Senate in the closing days of the last regular session.

Of the 100,000 American women who donned Wac uniforms to get a war over with, some 8,000 are still serving with the postwar Army, under Col. Mary A. Hallaren, their Director. More than a third of the remaining Wacs are stationed overseas—with the occupation forces in Germany and Japan, in Austria, Korea, and China, and in Panama with the Caribbean Defense Command. Other Wacs are assigned throughout Continental United States, both with the Army and with the Air Force, still doing, in smaller numbers, most of the 239 military jobs that Wacs performed during the war.

Many of these women, and many who have been discharged since the end of the war, now plan to make the Army their peacetime career. And many other women, particularly those too young to have seen service in World War II, are thinking about the Army as a career, just as they would consider business or teaching or the stage. For the experience of the Army with its wartime Wacs has established in the minds of most Americans the belief that the Army has a place for women—that the Army, in fact, needs the particular skills and aptitudes of women, in the same way that business and professions of all types have found it worthwhile to utilize those skills in their work.

There is no question about how the Army feels in the matter. All its top-ranking leaders went to bat for the WAC when the integration bill came up in the Senate. General Eisenhower, General Spaatz, General Bliss of the Surgeon General's Office, and General Miller of the Chaplain's Corps all appeared at the hearings to urge passage of the integration bill, as did Admiral Nimitz and other Navy leaders. Statements from General MacArthur and General Clay praised the work of the WAC in the occupation areas and urged that Congress make the corps permanent.



Chemical Warfare WACs perform many highly specialized jobs in great secrecy. Here a chemist works on research problems at the Technical Command of the Chemical Warfare Service at Edgewood Arsenal, Md., 1944.

The Army's reasons for wanting a Regular Army WAC were outlined by Maj. Gen. Willard S. Paul, Director of Personnel and Administration. Those reasons were four, he told the Senate—(1) to provide a nucleus of women in the Regular Army organized for immediate expansion in case of national emergency; (2) to find out how and where the skills of women can best be utilized before an emergency arises; (3) to provide for greater economy in the use of all personnel by utilizing women in jobs for which they are better suited than men; and (4) to assist in filling the Army's personnel requirements.

The last reason has since become the first. The Army must have Wacs, it has found, in order to fill its present vacancies. Current plans provide that priority will be given to training the first Regular Army Wacs to fill occupational specialties in which the most acute shortages now exist. Many jobs in the Medical Corps, finance, administration, supply, and transportation can be

handled by Wacs as soon as they are available in sufficient numbers.

The "nucleus of women" is an important part of our national security program, which contemplates maintenance of a nucleus of each type of unit that would be needed in case of an emergency. For maximum efficiency, therefore, the Army believes that every corps which might utilize women in an emergency should maintain a small unit of women ready for rapid expansion. The Women's Army Corps intends, through highly selective standards in the choice of key personnel, leadership courses for women, and specialist training, to develop a highly competent body of women to staff those units.

The idea of experimenting during peacetime to find out how and where women can best be utilized in the event of an emergency is also a must in the minds of Army leaders. They maintain that war permits no time for research in classification and assignment. With women in the Regular Army such research can be carried on constantly, and if an emergency should arise the Army will know at once where to place women and how best to utilize their services.

The Army's fourth reason is one of economy. The experience of World War II convinced most Army leaders that it is economical to utilize women, simply because they can do some kinds of work more efficiently than men can. Not only was it found unnecessary to use men as stenographers, telephone operators, and the like—but it was found that women could do those jobs better, as they have been doing them for many years in civilian businesses and professions.

And what of the woman who undertakes a career in the Army? What advantages will such a career offer her? For one thing, many of the women who donned soldier suits in World War II found that they liked being soldiers, just as some men have always liked being soldiers. And some Americans will always be attracted by the opportunity to serve in distant lands, as Wacs have and will, to serve in far corners of the earth which few of them would ever see as civilians. Many women will find interesting new types of work open to them in the Army as in no other field. All capable women who work can earn good livings, with a high degree of security, in Army jobs. But, above all, service in the Army will represent to many women an important contribution to the security of their country. Women in the Army, and in the other armed services as well, will play important roles in every phase of America's security program. Wartime Wacs had the satisfaction of having helped to win a war. The Wacs of the peacetime Army hope to help win a peace.

COL. JOHN M. MacGREGOR AWARDED LEGION OF MERIT

Col. John M. MacGregor, 70 Pine Street, New York City, was awarded the Legion of Merit Medal by Maj. Gen. Alden H. Waitt, Chief, Chemical Corps. The ceremony was held on 9 December 1947 at the New York office of the Chemical Corps, 111 East 16th Street, in the presence of a group of Chemical Corps officers and friends of Colonel MacGregor.

The citation reads:

> Colonel John M. MacGregor performed exceptionally meritorious service with the Chemical Warfare Service from October 1943 to June 1946. As Chief, Legal Branch, he directed the expansion of the entire legal staff of the Chemical Warfare Service at a critical period of the war and planned, established, and supervised for that Service its Contract Termination Settlement Organization. In doing so he exhibited exceptional leadership, keen perception in anticipating future problems, a recognized professional integrity and a mature, sound judgment which made him the trusted legal advisor to the Chemical Warfare Service. Later as a Chemical Warfare Intelligence Officer in the Asiatic-Pacific Theater he brought to the Service an experience and knowledge of dealing with foreign peoples which resulted in the obtaining, screening and recording of chemical warfare intelligence information of great value to the Service.

Colonel MacGregor, a veteran of both World Wars, is a lawyer and is presently in the Legal Department at New York University teaching law. During World War I he served in the Navy as a wireless operator on a submarine. During World War II he was Chief of the Legal Branch, Chemical Warfare Service, now known as the Chemical Corps.

He was born at Devils Lake, N. D., and moved to Portland, Ore., with his family while still in his teens. He received his B.A. from the University of Oregon and Doctor of Jurisprudence at New York University and Columbia University.

Colonel MacGregor is the National President of Alpha Tau Omega and a member of the Board of Directors of International House, 500 Riverside Drive, and a member of the Board of Managers, St. Andrews Society of the State of New York.

The Harshaw War Story

By K. E. LONG
Assistant to the President
Technical Development
The Harshaw Chemical Company

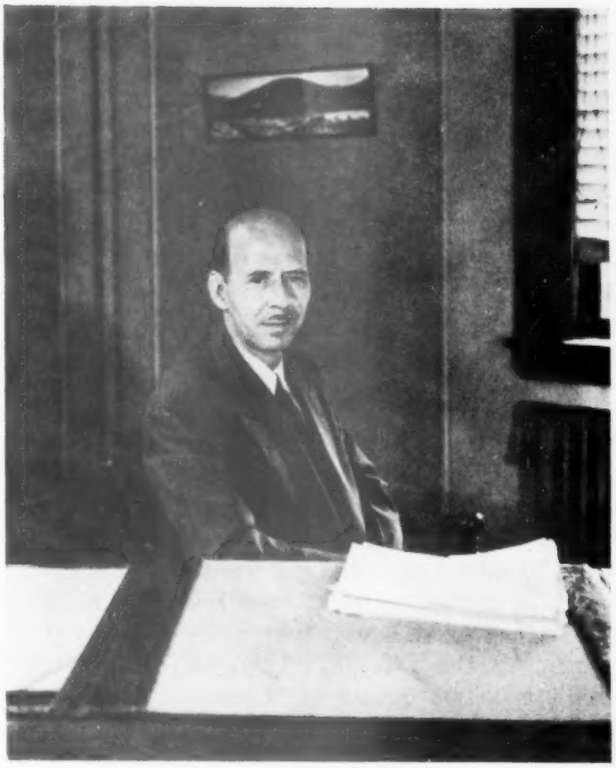
The Harshaw Chemical Company, manufacturers of industrial chemicals, had little trouble in converting most of its existing facilities to war production. The same chemicals are used for the production of petroleum, textiles, paint, rubber and a host of other products for war purposes as are used for similar peacetime products. Conversion in this case involved only changes in scheduling of products through the plant. The priority system insured the proper distribution.

In a few lines, such as ceramic colors, porcelain enamel frit and pigments, the wartime uses were not sufficient to keep the plants running. New products took up this slack and in some cases required the building of new facilities. Some of these new products were the result of research carried on during the preceding ten years and others were developed quickly, as the demand arose, by the Harshaw Research, Development and Engineering staff.

Anhydrous Hydrofluoric Acid

A good example of peacetime research resulting in war production was the rise of anyhdrous HF from a laboratory scale to a heavy chemical, supplying dozens of aviation gasoline plants with alkylation catalyst, replacing millions of tons of sulfuric acid.

Harshaw had manufactured hydrofluoric acid in water solution for many years and in an effort to improve the efficiency of the process had investigated the preparation of the anhydrous material. The process was beset with mechanical difficulties, but in 1936 a pilot plant was in operation and a little later a small plant was built to supply a company need and furnish research samples to the trade. Using this acid, research carried on by the oil industry resulted in the HF alkylation process for making aviation gasoline. When the big demand arose for aviation gasoline, the alkylation process using sulfuric acid was found to be limited by the availability of sulfuric acid and the problems of spent acid disposal. One part of anhydrous hydrofluoric acid was found to be able to replace about one hundred parts of sulfuric acid as a catalyst. An experimental alkylation plant was built and Harshaw contracted to supply the anhydrous HF.



KENNETH E. LONG
Harshaw Electrical Co.

To avoid possible corrosion troubles and unknown side reactions, the oil industry specified high purity acid. The experience gained in the pilot plant enabled Harshaw to agree to specifications, which have now become the standard for alkylation grade acid, many months before the large plant had produced a pound of acid.

The experimental alkylation plant was successful and many more were built. The HF plant in Cleveland was expanded, another was built in Texas and the Texas plant was expanded before the war ended. For a time production of HF reached 1,000 tons a month, which, as a catalyst, is the equivalent of approximately 100,000 tons of sulfuric acid.

The availability of anhydrous HF made possible the preparation of many other pure fluorides. Ammonium bifluoride, required as a flux for magnesium, was manufactured on a large scale with improved quality. Potassium bifluoride was required in large quantities and high purity as a silver solder flux and in the electrolyte for fluorine cells. The manufacture of boron trifluoride, a gas used as a catalyst, first made in this country by Harshaw in the middle 1930's,

expanded greatly during the war and a larger plant was built.

Synthetic Rubber Catalyst

Another war product which grew out of the prewar research was a tableted catalyst for the synthetic rubber program. Cooperation with the oil industry in the late 1930's resulted in the preparation of an activated aluminum oxide powder suitable for a catalyst support. For some purposes the powder had to be compressed into tablets or pills 1/8 inch in diameter by 1/8 inch long. It took about 12,000 of them to make a pound and a fair-size commercial tableting machine would turn out only about three pounds an hour. At first punch and die life on the tableting machine was very short due to the abrasive nature of the aluminum oxide, but means to overcome this were found and about 30,000 pounds of 1/8-inch tablets were made over a period of a year and a half with three machines.

In the fall of 1942 the Rubber Reserve required a similar catalyst formed into 1/8-inch tablets on a schedule of delivery which necessitated production at the rate of 20,000 pounds per day. This is nearly a quarter of a billion "pills" a day. Early in 1943 a plant was in production in Elyria, Ohio, making not only the catalyst tablets but the punches and dies necessary to keep the tablet machines in operation.

Fluorine

Harshaw became interested in the preparation of elemental fluorine in the middle 1930's when the production of the country could be measured in grams per day. A small cell was built which would produce fluorine at the rate of 5 to 100 grams per hour, but since no immediate use was found for the fluorine, work on the project was suspended until the fall of 1941. A few days before Pearl Harbor an agreement was reached to take on an educational order for a product which required elemental fluorine in its manufacture. This was the beginning of Harshaw participation in the atomic bomb project, for which they were awarded the Army and Navy "E" with four stars in October 1945.

In 1941 fluorine was still a laboratory curiosity. In building larger cells, defects became troublesome which were not apparent in the small cell. Nickel anodes, which were successful in the small cell, were found to corrode at a fairly rapid rate and foul the electrolyte of the cell. By July 1942 it was apparent that if fluorine was to be produced on a large scale, some intensive research must be done to improve the cell. A study of the various types of fluorine cells was undertaken under an O.S.R.D. contract, in cooperation with other Government contractors with an interest in fluorine.

In a remarkably well coordinated program of research the cell problems were solved, one by one, by various members of the group and, as a result, not one but several practical fluorine cells were developed.

Manhattan District

One of the first contractors of the Manhattan District, Harshaw produced over a dozen different products for the atom bomb project. Some were ordinary chemicals in a high state of purity and others were new materials which had never been produced in quantity before.

General Groves mentioned one instance in his speech at the presentation of the Army and Navy "E" Award involving the production of large quantities of a new material which had been made before only in laboratory equipment. In twelve days from the time the request was made, a plant was built and the first shipment was made. Complete cooperation among Research, Development, Purchasing, Engineering, Plant and Manhattan District personnel made this remarkable achievement possible.

Napalm

Napalm, the aluminum soap thickener for gasoline used in fire bombs, was never produced in quantity by Harshaw but under a contract with N.D.R.C., research on the material was carried on up to the end of the war. With a background of many years' experience in making precipitated soaps for the paint and grease industries, the production of Napalm was a logical step for the company but the precipitated soap plant, operating to capacity on other products needed for the war effort, was not capable of being expanded at the existing site. Production capacity for Napalm was obtained elsewhere but the company's experience was utilized through the research program in evaluating processes, raw materials and finished products made by others.

The physical properties required in Napalm were very exacting, but the natural fats and oils used in its manufacture were variable in composition. To avoid failure of Napalm in the field, a very close check was made on raw materials and for a while samples were received from producers all over the country. Laboratory batches of Napalm were made from them under standard and variable conditions and the resulting products were compared with standards. When one of the ingredients of Napalm, naphthenic acid, be-

came scarce due to other important uses, an acceptable substitute formula was developed.

Towards the end of the war, in cooperation with Chemical Warfare Service personnel working in the Harshaw laboratory, a liquid thickener was developed to take the place of Napalm where rapid mixing was essential.

Crystals

One of the prewar projects which developed rapidly during the war was the production of synthetic crystals for optical purposes. Crystals of sodium chloride, potassium bromide and lithium fluoride had been made on a small scale, but the war brought new uses and requests for new crystals.

Crystals transmitting infrared light were used as prisms, lenses and windows in analysis of the raw materials used for the production of synthetic rubber and aviation gasoline, cutting hours and sometimes days from the time required for an analysis. Single crystals, up to 25 pounds in weight, were necessary to furnish large prisms.

When new infrared devices were developed requiring weather resistant windows transparent to infrared light, silver chloride was considered, but no source of supply was available. Mineral silver chloride or "horn" silver usually has a dark color, but it was found that the synthetic material could be made colorless and grown into single crystals weighing many pounds. Furthermore, the single crystals could be rolled into sheets or pressed into optical shapes without destroying their optical properties.

Research at Massachusetts Institute of Technology resulted in a process for growing single crystals of optical calcium fluoride, larger and less strained than known natural material. The equipment and process information were transferred to Harshaw and production of this material began just before the end of the war.

Other War Projects

Before the United States entered the war, the Belgian suppliers of cobalt felt that their cobalt processing plant in Belgium was not safe and suggested that Harshaw refine a crude alloy produced in Africa. A process was worked out and equipment installed before the supply of refined material was cut off by the German entry into Belgium.

When the magnesium industry expanded in the early part of the war, manganese chloride was required in large quantities. Ordinarily a by-product imported from Europe, no domestic source was available. Harshaw developed several processes of making it which were used until the raw material supplies were exhausted and finally made it from ferromanganese at the rate of 20,000 pounds per day.

Anhydrous hydrogen chloride was made available in cylinders, for use as a catalyst in the oil industry, through a cooperative arrangement with producers.

Aluminum chloride used in the oil industry as a catalyst was manufactured in plants built in Niagara Falls, Houston and Henderson, Nevada, in cooperation with chlorine producers.

Antimony trichloride, used as a catalyst, was produced first in the Harshaw Cleveland plant and later in Niagara Falls.

In the pigment line, Harshaw produced a special grade of antimony sulfide used in camouflage paint and antimony oxide for flameproofing tent canvas. Antimony oxide was produced at capacity at two plants all through the war and as the war ended the El Segundo, California, plant was the largest antimony plant in the country operating on domestic ore.

CHEMICAL CORPS' PARTICIPATION IN SUGGESTION PROGRAM DURING FISCAL YEAR 1947

By LT. MARY B. WARNER, *CmlC*

The Suggestion Program during 1947 proved remunerative to the civilian employees of the Chemical Corps through the monetary appreciation of the Department of the Army.

During the fiscal year 1947, with a civilian strength of 6,331, of the 535 suggestions submitted, 78 were adopted. Awards paid amounted to $3,343.75. The estimated first year's savings were $177,704.79!

The largest award in 1946, $2,002.92, was granted to an employee of the Chemical Corps! While an employee in the Inspection Division at Edgewood Arsenal, Md., Mr. Reginald H. Driggs saved the United States Government $2,889,600 by suggesting that some 900,000 gas masks with pure rubber facepieces, ready for scrap, be salvaged. Mr. Driggs designed a tool which was used to eliminate temple pressure in the gas mask facepiece, the pressure being the reason for their intended scrap. The estimated cost for making the masks serviceable was $3.40 for labor and materials. With the tool devised by Mr. Driggs at a manufacturing cost of $5, no additional material was required and the labor cost per unit was $.05. Thus the enormous saving.

Reserve Courses Resumed at C. C. School

By COL. M. E. BARKER, *CmlC*

Training of Chemical Corps Reserve Officers in two-week classes at the Chemical Corps School was resumed on Monday, 25 August 1947, for the first time since the beginning of World War II. Prior to that time, and since the end of hostilities with Japan, Chemical Corps Reserve Officers had been eligible to attend 12-week courses of instruction and to be placed on applicatory duty for various periods of time up to 90 days.

The resumption of training in classes of two-weeks' duration at the Chemical Corps School is of interest to all Reserve Officers of the Corps and to members of the Chemical Corps Association who are interested in keeping up-to-date and keeping themselves prepared for any future emergency. The plan of training is to conduct three of these two-week courses at successively higher levels. The course conducted during the last week of August and the first week of September, this year, was known as the First Reserve Officers' Refresher Course. This course was built primarily around a study of Chemical Corps material, with all students being given thorough instruction in the portable flame-thrower including practical maintenance and firing work, and all students being subjected to the gunnery examination. The results in the gunnery examination were very gratifying as nearly half of the class completed with the rating of Expert Flame-Thrower Gunner. There was a brief course also in mortar gunnery and demonstrations in the application of mortar gunnery to firing problems. Likewise there were other periods of instruction in materiel and a general review of the newer type chemical agents, methods of computing ammunition requirements, and the application of meteorology to smoke generator and other chemical problems. Approximately half of the course was devoted to theoretical work in the classroom and half to practical work outdoors or in the shops. One hundred and sixty-four (164) officers completed the course.

The student officers came from all six of the Armies, with the Fifth Army furnishing the largest single group of 49 officers. This entire group was assigned as Section II of Group I for the instruction. The First Army likewise

had a large group that composed the entire Group I of Section I. The total class of 164 students was divided into four sections for instruction purposes. In the lecture room two sections were combined into a single group while for practical work the instruction was given by sections.

In preparing for this class the School set up a maximum quota of 80 officers, thinking that on account of the relatively short period available for notices to be distributed all over the United States that 80 students would be as many as might apply. Instead of that at least three times that many applied for the course and the capacity authorized for the course was more than double. One hundred and eighty-eight (188) orders were actually issued by the Armies and 168 students reported for duty. Twenty (20) students had their orders cancelled because of unforeseen contingencies that prevented their arrival at the camp and four (4) students had to be returned to their homes on account of failing to pass the physical examination.

It is the plan in the future to continue the Reserve Officers' Refresher Course at various intervals, keeping the instruction up-to-date for those officers who have not had a school course since World War II regardless of rank or previous experience or future assignment. This Refresher Course is considered essential in order to give all Reserve Officers an opportunity to get squared away and brought up-to-date on their military profession. After completing this Reserve Officers' Refresher Course it is planned to divide the students thereafter into two groups: those to be assigned to technical and manufacturing operations and those to be assigned to duty primarily as soldiers, such as division, corps, and army chemical officers; staff officers for the War Department; chemical troop leaders of mortar smoke generator and service type units; and to other duties requiring a knowledge of military operation. The officers in the technical group are to be given the choice of taking three out of five selected subjects for two 2-week courses—one a basic presentation and the other a more advanced presentation. For those who are to be educated essentially as soldiers and for the support of military operations the second 2-week course will be known as the Reserve Officers' Staff Course and will be devoted essentially to a study of military organization, staff organization, staff functioning, and preparation of military papers. The third course in the series will be devoted to a study of military tactics and technique, with special emphasis on combat arms operation.

It is planned that the next Reserve Officers' Refresher Course will be given from 14 June to 25 June 1948 for those officers who have not had such a course. The third Reserve Officers' Refresher Course will be given for a 2-week period beginning 12 July 1948, and the first Reserve Officers' Staff Course will be given for two weeks beginning 26 July 1948. Reserve Officers of all ranks are available for these additional courses.

Likewise it is planned to conduct a 4-weeks Field Officers' Course for officers of all sections of the armed forces at the Chemical Corps School starting 12 July 1948. Full Colonels of the Organized Reserve will be eligible for this course provided they have completed the first Reserve Officers' Refresher Course. After graduation from the three successive 2-week Reserve Officer courses, or from the Reserve Officers' Refresher Course and the Field Officers' Course, and having completed a certain amount of correspondence school work (to include the 40 Series), the officers concerned will be eligible for assignment as students to the Command and General Staff College. These authorizations, dates, and so forth will be published to all Reserve Officers through official channels, and the official dates will govern; but it is suggested that those interested in these School courses make their plans now for the dates and courses in which they are especially interested and that they submit their applications through military channels to their respective army headquarters as soon as they are reasonably certain as to the dates and courses which they will be able to attend. Hereafter it is planned to limit classes to not more than 80 officers in any one class in order that the facilities and instructors of the School can be used to provide the highest possible type of instruction and that the students may be as comfortable as possible in the School dormitories.

WORK OF CC MEDICAL DIVISION

(Continued from page 12)

the story is different. A few minutes after a small dose of either drug, the intestine, now sensitized by DFP, begins rhythmic contractions that rapidly relieve the distressing symptoms. The combined use of both prostigmine and pitressin, after DFP sensitization, brings relief in the severest cases which can be described as nothing short of dramatic. Subsequent doses of DFP at 8 to 12-hour intervals afford continued relief and comfort to these patients. DFP has not failed once in 57 straight cases.

When a new *war gas* can lead to so much relief of human misery, it makes one happy to be associated with chemical warfare research.

NEW OFFICER PROMOTION POLICY FOR NATIONAL GUARD IS ADOPTED

A new promotion policy for officers of National Guard Army units was announced today by Maj. Gen. Kenneth F. Cramer, Chief of the National Guard Bureau.

Under its terms, minimum service in grade in the postwar National Guard plus a rating of excellent will make officers eligible for promotion to the next grade. Affected are the ranks of first and second lieutenant, captain, major and lieutenant colonel.

Hitherto, vacancies in these grades, with the exception of second lieutenancies, could be filled only by men having held similar positions in grade or responsibility during active federal wartime service. Second lieutenants may be commissioned from among eligible enlisted men of the first three grades.

For promotion to the next grade the following minimum service in grade in the postwar National Guard is required with the exception that service in a similar rank during the war may also be counted toward the minimum requirement:

Second lieutenant	2 years
First lieutenant	3 years
Captain	5 years
Major	3 years
Lieutenant colonel	4 years

Under a special provision, officers appointed to a lower grade because there was no vacancy in their unit for the higher grade but actually performing the duties of the higher grade may be promoted to the higher position after a minimum of one year service with an efficiency rating of excellent.

The new rules will prevent a loss of valuable officer material to the National Guard. Under the wartime service requirement it was necessary to fill many vacancies with officers who were within a year or less of the maximum age level for their particular grade. Instead of the men being forced to resign when they reach the maximum age limit for their grade they may now be promoted to vacancies in the higher grade if they meet the new minimum service requirements.

Officers federally recognized in the postwar National Guard in the grades affected included 1,095 lieutenant colonels, 644 majors, 4,732 captains, 4,936 first lieutenants and 2,093 second lieutenants, for a total of 13,500, as of October 31, 1947.

A promotion policy for officers of National Guard Air Units will be announced in the near future, General Cramer said.

Eastern Chemical Depot—1921-1947

By MAJOR ROBERT H. KENNEDY

It has been more than twenty-five years since the Eastern Chemical Depot (originally designated as the Edgewood Chemical Warfare Reserve Depot) was first authorized by a War Department general order and established in the Bush River Area on the Edgewood Reservation. World War I had been over for almost two years and the Chemical Warfare Service, born late in that conflict, had itself only recently become a permanent part of the Regular Army. The last of the research divisions, located during the war in Washington, had been moved to the site of the gas manufacturing plants at Edgewood Arsenal, Maryland, and the Chemical Warfare Service, assured of a place in the scheme of national defense, began to organize for the years to come. While the laboratories at the Arsenal designed new equipment and synthesized new compounds, the plants produced these materials and turned them over to the Depot for storage.

The Depot was maintained as a separate installation from 1921 until April 1942, functioning independently of the command of Edgewood Arsenal except in administration matters, police and fire protection. With the reorganization of the Edgewood Chemical Warfare Center for wartime operations in April 1942, the Depot became an integral part of the command and remained so when the Center was redesignated the Army Chemical Center early in 1947. In the course of that time, however, the formal name of the Depot was changed three times: first, to Edgewood Chemical Warfare Depot, in 1927; then to Eastern Chemical Warfare Depot, in 1943; and recently, it became simply the Eastern Chemical Depot.

Despite changes in name, the mission of the Depot has been fairly constant, subject to changes in nomenclature rather than function. In peacetime it has been principally a storage depot, with minor distributing functions. During World War II it operated as a distribution, filler, and reserve depot. As a distribution depot, it received and stored general chemical warfare supplies for distribution to all Army installations located in Maryland and Virginia and to the Military District of Washington, and it received and stored chemical training ammunition and hazardous materials for distribution to all installations in the First and Second Army areas and in the Military District of Washington. As a filler depot, the Eastern Chemical Depot received and stored all types of chemical ammunition and hazardous material for shipment overseas through the ports of embarkation. Finally, as a reserve depot, it received and stored reserves of chemical warfare general supplies for future distribution, and also reserves of all types of chemical ammunition and hazardous materials for future distribution.

When World War II began, the Eastern Chemical Depot was the only one of its kind then existent in the United States. It was small, compared to its present facilities, and its reserve of chemical warfare items was low. In it were the first stores of toxic gases received from the Arsenal plants, which had recently begun operations again, and large numbers of items procured through educational orders—principally gas masks—were beginning to pour into the Depot. To the Eastern Chemical Depot at once fell the burden of depot supply from its meager reserve stocks. In that first year of the war it was completely responsible for the shipment of chemical warfare supplies and equipment to all posts, camps, and stations in the Continental United States, and to Hawaii and the Philippines. Later, when other chemical warfare depots were established and operating, the range of responsibility of the Eastern Chemical Depot was narrowed and it became the supply depot for the First, Second, and Third Service Commands, the Baltimore and Hampton Roads Ports of Embarkation, and the staging area under the control of Hampton Roads.

Personnel to handle the wartime demand on the Depot rose from 3 officers and 34 civilians in July 1940 to 13 officers and 321 civilians in October 1942, at which time near peak demands were being made on the Depot. With the plants and laboratories at Edgewood Arsenal, the Aberdeen Proving Ground, the Glenn L. Martin Aircraft Corporation, and all the wartime industries in Baltimore competing for personnel, acquiring those 321 people for the Depot was an "E" award job in itself. As other depots came into being, in Arkansas, Alabama, Utah, New York State, Indiana and elsewhere, the work load shifted, and as the months went by and labor-saving devices and operational efficiency were acquired, the Depot performed its mounting tasks with decreasing numbers of personnel.

After VE-Day and VJ-Day, the tide of supply turned as the Depot became a storage center for chemical warfare surplus property. Mountains of material poured in before the momentum

of wartime production could be brought to a stop, and as this material was being disposed of or stored, the Depot was again swamped by the first incoming shipments of surplus materials from Army camps and installations which were going out of business in this country and from the chemical depots and stations overseas. In December 1946 the number of freight and gondola cars rumbling across Wise Road had begun to diminish but it still required 5 officers and 111 civilians to handle and maintain storage operations at the Depot.

Some idea of the magnitude of depot operations in the midst of war can be obtained from a comparison of incoming and outgoing shipments in a representative peacetime year with two typical periods during the war. In the entire year of 1930, for example, there were 685 tons of incoming shipments and 548.17 tons of outgoing shipments. This was an approximate average of 57 and 45 tons, respectively, per month. In contrast, the month of July 1942 alone brought 4,543.6 tons of incoming shipments into the Depot, and saw 6,317.6 tons of outgoing shipments. Again, figures for the month of April 1945, possibly reflecting both the momentum of production we had achieved in this country as well as the success of our arms overseas, showed 5,707 tons of incoming shipments and outgoing shipments totaling 4,776 tons. Thus, while shipments increased more than a hundredfold during the war, the personnel to handle them increased less than tenfold.

As might be guessed, the major items shipped from the Depot in the first year and a half of the war were protective materials, including bleach, DANC, 1½-quart and 3-gallon decontaminating apparatus, gas-proof curtains, impregnite, diaphragm and service gas masks, protective ointment, and dust respirators. Almost 400 carloads of gas masks were shipped in the first year of the war. Next came the call for training ammunition: instructional incendiary bombs; tear gas capsules, grenades, candles, and pots; smoke grenades and smoke pots; colored smoke grenades; land mines; detonators, squibs, and bursters; 4.2-inch instructional shell, and gas identification sets. This training material was shipped to Army Air Forces installations, Ground and Service Forces schools, replacement training centers, civilian protection schools and to the various Service Commands for the training of state guards. And the Depot worked seven days a week to keep the material coming and going.

From 1943 on, the Depot began receiving great quantities of offensive equipment and material: 4.2-inch high explosive shell, 500-pound incendiary

bomb clusters and other incendiaries, Napalm filling, smoke pots, and nitrogen and hydrogen cylinders for the flame-throwers going into action overseas. Classed as hazardous materials, these were stored in the Bush River Area of the Depot which consisted of almost 60 warehouses, magazines and igloos, and was also the site of the toxic gas yards of the Depot. It was from the first small stockpile of material in this area that 48 AN-M 54 incendiary bomb clusters, weighing a total of 36,240 pounds, were taken in February 1942 and shipped to a California arsenal "for reissue on call to Lt. Col. James M. Doolittle." Before the war was over almost 230,000,000 additional pounds of incendiaries from this and other depots of the Chemical Warfare Service were to be shipped for eventual direct issue to the islands of the Pacific Ocean Area.

In the Toxic Gas Yard Area, with a capacity of almost 3,200 ton containers and 500 drums, mustard gas, lewisite, phosgene, clorpicrin, and hydrocyanic acid, were stored in ton containers; sulfur trioxide, titanium tetrachloride, CNS, CNB, and molasses residuum were stored in 55-gallon drums, while white phosphorus was stored under water in pits or in 55-gallon drums. In the early days of the war, railroad cranes were used to load and unload these containers and drums in the yard, and shifting the material in the yard was done by hand. Later, caterpillar cranes and truck-mounted cranes were obtained to speed up operations.

Although a small amount of the incoming and outgoing shipments of the Depot were made by trucks, the greater part was by rail. Each morning the Pennsylvania Railroad brought in a train of incoming shipments. The engines in the classification yard at Edgewood Arsenal picked up this train and distributed its cars to the Depot and to the Plants Area, and in the afternoon made up a new train of outgoing shipments.

Today the war is once again two years in the past and the incoming and outgoing shipments are growing smaller month by month. The Depot, like the Army Chemical Center of which it is a part, is once more organized for the years of peace.

For Former Air Corps Chemical Officers

Conversation with many Chemical Corps Reserve Officers who served with the Air Forces during the recent war has indicated that very few were informed at separation centers that they might elect to accept an Air Corps Reserve commission instead of a Chemical Corps Reserve commission. It is felt that many such officers may have a personal preference for continuing their service with the Air Reserve, where past experience with air force chemical problems will enhance their value in any future emergency.

For interested officers who desire to transfer to the Air Reserve, with MOS of 7314, the procedure is to address a letter to the Commanding General of the Army area in which they reside, requesting such transfer and stating reason for request. Transfers will be made only in the interests of the service and when made will be without change in grade or date of appointment. The officer concerned will serve the unexpired portion of his five-year appointment in the service to which transferred.

Headquarters of the Army areas to which requests for transfer may be addressed are as follows:

1. Headquarters First Army, Fort Jay, Governors Island, New York.
2. Headquarters Second Army, Fort George G. Meade, Maryland.
3. Headquarters Fourth Army, Fort Sam Houston, Texas.
4. Headquarters Fifth Army, 1660 East Hyde Park Blvd., Chicago 7, Illinois.
5. Headquarters Sixth Army, Presidio, San Francisco, California.
6. Headquarters Third Army, Atlanta 3, Ga.

Headquarters of the Air Defense Command numbered Air Force areas coinciding in the same order with the above Army areas are listed below. Further information may be secured by writing the Chemical Officer of the numbered Air Force concerned.

1. Headquarters First Air Force, Fort Slocum, New York.
2. Headquarters Eleventh Air Force, 1612 South Cameron Street, Harrisburg, Pa.
3. Headquarters Tenth Air Force, Brooks Field, San Antonio, Texas.
4. Headquarters Second Air Force, Offutt Field, Fort Crook, Nebraska.
5. Headquarters, Fourth Air Force, Hamilton Field, California.
6. Headquarters Fourteenth Air Force, Orlando, Florida.

Inquiries may be directed to Headquarters Air Defense Command, Mitchel Field, New York, where they will be redirected to the proper agency.

JOINS STAFF OF OFFICE, CHIEF, CHEMICAL CORPS

Captain John Moran has reported to the Office, Chief, Chemical Corps, for duty with the Supply and Procurement Division.

A graduate of Rhode Island State, Captain Moran was commissioned a 2nd Lieutenant, Inf. Res., in June 1942, and was called to active duty the same date, reporting to Ft. Benning, Ga., for duty with the 28th Infantry Division, Pennsylvania National Guard.

He served with the 28th Infantry Division in the European Theater of Operations from November 1943 to October 1945, earning five campaign stars, the Bronze Star Medal and the Purple Heart.

Captain Moran was integrated into the Regular Army, Chemical Corps, in the Second Integration, reported for duty with the Chemical Corps on the 29th of October 1947 at the Army Chemical Center, and reported to the Washington Headquarters 24 November 1947.

ACC MOVE PLAN DROPPED

The Department of the Army has announced that movement of the Army Chemical Center from Edgewood Arsenal, Maryland, is not contemplated and that the Huntsville, Alabama, arsenal installation is to be declared surplus.

Industrial Mobilization Plans Require Anti-trust Law Revision

By Al Leggin

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With the world conditions in such an unpredictable state, one of the problems causing concern to American industry is the government's industrial mobilization plan for a future emergency.

Industrialists realize that a one or two-year period for the preparation and expansion of their industries to meet the wartime needs of the armed services and civilian population will not be available, should war again be declared. During the last war, while our Allies held the enemy, our industries were able to reconvert plants from civilian commodities to war items as well as expand their facilities to meet the tremendous requirements of war. The chemical industry alone doubled its prewar production capacity for wartime requirements. This gigantic task was only accomplished because of the time available.

In the event of another war this period of preparation will not be available and industries will be required to convert to a wartime basis practically overnight. To accomplish such a task industry must have knowledge of the nation's emergency requirements, both military and civilian, in order that plans for reconversion can be drawn and the engineering problems involved studied. The government, on the other hand, must know its requirements and the current productive capacity of the various industries needed to fill those requirements.

The chemical industry, having learned a lesson during the past war, desires an industrial mobilization plan from the armed services which would indicate a total requirement for all chemicals, both direct and indirect. Piecemeal procurement planning by the individual services is unsatisfactory since such planning only indicates a requirement for certain chemicals as an end item product for a particular service. Prior to the past war such planning was used and several services, investigating capacities of particular plants, each anticipated the productive capacity of that plant. The needs of other services as well as the indirect need for these chemicals in other military items were not considered; consequently, the particular industries could not supply all the requirements. The chemical mobilization plan is also highly specialized, since not only are productive capacities involved but also such other factors as skilled manpower, transportation, and containers. These other factors must be considered in aiming at production figures. If the wartime chemical requirements of all the armed services could be consolidated by an individual agency, the industry could anticipate the needs for expansion or rearrangement and be prepared on short notice.

This consolidation of requirements is now even more important since many of the newly developed items of military munitions and equipment, such as jet propelled planes, rockets, etc., will require huge quantities of chemicals not now being produced on a large scale. Each of the services is conducting research work on similar items and the procurement agencies of these services in turn are studying the possible productive capacity of this material. Industry receives individual inquiries but no over-all requirement which would present a picture of what capacity would be required on short notice is visualized.

While industry needs consolidated requirements, the armed services require information on the capacity of industry to produce the required chemicals. The services are in the same predicament as industry since they have no particular source of information to obtain data on the over-all capacity of the chemical industry.

As a result of this conflicting situation no coordinated industrial mobilization plan has yet been presented. Steps, however, are now being taken to correct the present situation. The formation of the National Military Establishment by the last Congress was the first step to integrate the activities of the various armed services. Within the structure of this organization the Munitions Board, headed by Thomas J. Hargrave, is now consolidating the chemical requirements of the various military services. On an organizational level above the defense establishment is the National Security Resources Board, a peacetime WPB, which will consolidate the over-all military and civilian needs. This is a step forward in the formation of a coordinated plan, but to have a complete plan these boards must have consolidated information regarding the combined productive capacities of industry in order that these capacities can be allocated to particular needs.

Industry, especially the chemical industry, is particularly desirous of forming committees to study its productive capacity to fit into the program, but existing statutes prevent such coordination. The present antitrust laws do not permit representatives of various companies to meet to discuss the capacities of these companies and the allocation of requirements among them to meet the most important needs. Yet the National Security Resources Board and Munitions Board require the formation of such industrial committees before a workable plan can be drawn.

Prior to the last war, such a chemical advisory committee was formed to work with the Army and Navy Munitions Board in discussing the supply and requirements of chemicals, but the actions of this committee were of a sub rosa sort. The representatives of the industrial committee were aware of the antitrust action that might be brought against them and therefore could not act as a formal committee. Special concessions, however, were made by the President at that time and all actions by this committee were placed in a classified category for the armed services and were not available to the Department of Justice for antitrust action. By the end of 1940, through the efforts of this committee, military requirements, production, civilian consumption, industrial capacity, imports, exports, and stocks had been consolidated for 100 critical chemicals. As a result of these studies the chemical industry was able to expand rapidy to meet the wartime needs. Since the war these concessions are no longer in effect; therefore, the committee cannot meet as in the past.

In order that such a chemical industry chemical advisory committee can again be made operative to aid in the formation of an industrial mobilization plan, Congress must pass legislation to exempt such advisory committees from antitrust action by the Justice Department. It is understood that such measures will be presented to Congress shortly.

A similar situation regarding industrial advisory committees is also being met by the sponsors of the Marshall Plan. In order to provide voluntary rationing within the various critical industries, committees will be required to discuss the situation. These same statutes will prevent such a move unless special legislation is provided.

Should this legislation fail to pass Congress, two alternatives are possible to form these advisory committees. First, the White House may issue instructions similar to those issued in 1938. Should this arrangement not be possible, a society or trade organization should be permitted to act as an intermediary and form a committee to formulate the chemical plan by working with both the military establishment and the chemical industry.

Join the CHEMICAL CORPS ASS'N

⋆WHAT THE ASSOCIATION DOES:

The members of this Association, mindful of the vital importance of chemical warfare in the field of national defense, have joined together as a patriotic obligation to preserve the knowledge derived from their war experiences and to encourage improvements in science as applied to the Chemical Corps. The objects of this Association, therefore, are to sponsor new developments designed to increase the efficiency of chemical warfare means, to collect and disseminate useful knowledge with respect to chemical warfare and related subjects, to foster a spirit of good will and cooperative endeavor among its members and with industry, and to perpetuate the friendships, memories and traditions growing out of their service with the Chemical Corps. The members of this Association and its constituent local Chapters are mutually pledged to the furtherance and promotion of these objects.

⋆WHO IS ELIGIBLE FOR MEMBERSHIP:

Any person who is or may be assigned or detailed to duty with or in the Chemical Corps, whether as officer, warrant officer, enlisted man or civilian employee, or who has been honorably discharged from such duty, and any person interested in the promotion of chemical warfare preparedness for national defense, may upon approval of the Executive Committee and payment of the annual dues hereinafter specified become a Regular member of this Association.

DO IT NOW!

If you are not now a member, fill in this application and mail it today.

TO: CAPTAIN JOSEPH SCHWIMER, Secretary, Chemical Corps Association
Room 205, 928 Fifth St. N.W., Washington 1, D. C.

I hereby apply for membership in the CHEMICAL CORPS ASSOCIATION. Inclosed herewith is check or money order in the sum of:

Regular membership $5.00 ☐ Student membership $2.50 ☐
Group membership $100.00 ☐ Life membership $100.00 ☐

Of the sum remitted for dues $2.00 is for the annual subscription for the Chemical Corps Journal, and $.50 is for the annual subscription for the Chemical Corps News.

I am a citizen of the United States of America with a deep sense of the obligation of every citizen to devote himself unstintingly to the cause of our nation's defense whenever the need arises. I have a particular interest in the Chemical phase of national defense.

Military affiliation or CWS activity, if any, in World War II .....

Name .....

Address .....

City .....

Fred M. Jacobs Takes Over Association Office

(Continued from page 2)

of his time to organization and to promotion of membership in the Association.

After 40 years of experience as executive and ownership of industrial businesses, Mr. Fred M. Jacobs entered the service of the Chemical Corps in 1942 and organized the Control Division of the New York Procurement District. His success in that position resulted in his coming to Washington headquarters with the Chemical Corps where he rose from an analyst's position to the Executive of the Management Office, Office of the Chief. Resigning from that position in May, he has been induced to engage his talents to the welfare of the Chemical Corps Association and has entered upon his duties acting as secretary and treasurer of this Association. He is devoting his full time to the activities of the Association in office management, membership and organization, and generally taking over all of the duties of these activities. These expanding activities of the Association made it necessary to arrange for full-time advertising management as well as full-time secretary-treasurer. This addition to personnel will give an opportunity for service to individual members as well as chapters that could not be otherwise given. Probably no individual member of the Chemical Corps has a wider knowledge of C.C. activities and acquaintance with those in executive capacities than Mr. Jacobs who visited practically every installation of the Chemical Corps in the last five years and if you want to know the answers to any question he can put you in a position to get it for you even if he isn't in a position to give it to you himself.

Joe Schwimer is devoting his full time as advertising manager of the "Chemical Corps Journal" and has established his headquarters in New York City.

CHEMICAL TRAINING

(Continued from page 16)

we have our distinct place in these plans and are doing our share in the forcasting of the rapid expansion which will be required should another emergency arise.

I hope that within the time available to me on this question I have succeeded in providing at least a partial answer to some of your questions and conveyed to you some conception of the efforts which the Chemical Corps is making to do its part in making the Reserve Officers' program what it should be from the viewpoint of individual officers, the Army and the Chemical Corps. In conclusion, I would like to state that the Department of the Army *is* fully cognizant of the difficulties being met in the ORC program and is doing everything possible and will *continue to do* everything possible to remedy these difficulties.

EXIT GAS WARFARE?

(Continued from page 3)

of a new gas. Because the Germans started the destruction of complete cities in the last war, it is reasonable to believe that again the civilian masses will be subjected to the enemy's worst weapons. We must be prepared for preventive measures and retaliatory action! That means the developing of new toxic gases by the United States and keeping advised of those new gases being developed by potential enemies in order to provide masks which give proper protection.

Our country's activity in developing superior air power and guided missiles is most gratifying to our sense of security. That work is absolutely essential. Air power in modern warfare serves as longe range artillery, as is also the case with guided missiles. However, the bomber without its bombs and the missile without its warhead would become impotent. What "packages" will the bombers and the missiles carry in the next war? In World War II, the principal loads were high explosive and incendiary bombs. High explosive will be augmented but not replaced by atomic bombs. Annihilating gases and contagious, rapidly-spreading diseases will be added. It is apparent that three of the four or five destructive agents will be developed by the ever-decreasing Chemical Corps.

While we are properly spending such large sums of money developing the "carriers," it would seem more congruous if we would stop cutting back the Chemical Corps and provide the necessary means for it to develop the most damaging "packages" possible during that period allotted by peacetime.

No, gas warfare is not obsolete! It only skipped a war due to our gas preparedness. If we fail to maintain our relative preparedness, our next enemy will no doubt overwhelm us with such quantities of gas that we may never recover. You can expect a rebirth of gas warfare in World War III in such a hideous and brutal form that there will be retrospectively gratefulness that it was not employed in No. II.

LUDLOW KING

CHAPTER NEWS

HAWAII CHAPTER

The Hawaii Chapter of the Chemical Corps Association is still active and becoming more so every month.

We are having regular monthly meetings to which we invite outstanding guest speakers. Furthermore, we are making efforts to bring close relationship between ourselves and the extensive sugar and pineapple industries located on the island.

The membership committee, which to date has consisted of yours truly, is beginning to come to life. As a result I expect to be able to forward a money order to you later in the month.

Attached are two copies of the minutes of the last meeting. All of us were gratified to read the two write-ups on us which appeared in the October issue of the *Journal*. Perhaps we will do something noteworthy again soon.—EUGENE E. MONK, *Capt., Cml, Secretary-Treasurer.*

Left to right: Capt. G. M. Correll, Don C. Micheau, Joseph Schwimer and Lt. Col. Roy W. Muth.

COLUMBUS CHAPTER

The formation of the Columbus Chapter was launched at a meeting held on October 29, 1947, at the Army-Navy Club, Ft. Hayes Columbus, Ohio. At this meeting, which was presided over by Maj. Don C. Micheau, CmlC Reserve, 23 officers and former officers of the Chemical Corps attended. The meeting was forturate in having Joseph Schwimer, Secretary-Treasurer of the National Association, as a speaker, and Joe did everything in his power to see that the chapter was furnished all facts necessary to make the formation of the new chapter an easier job.

Lt. Col. Roy W. Muth, CmlC, Deputy Chief of the Industrial Division, Chemical Corps, gave a very interesting talk on "Chemical Preparedness and Procurement."

Lt. Col. George A. Rechtin, CmlC Reserve, was appointed temporary secretary.

The next meeting of the chapter will be held some time in January, 1948, at which time permanent officers will be elected.

SAN FRANCISCO CHAPTER

The annual dinner meeting of the San Francisco Chapter of the Chemical Corps Association was held on November 25, 1947, at the Marine Memorial Association, and seemed to be thoroughly enjoyed by those who attended.

Mr. John Park Davis, who was the attorney for the Baruch Committee, gave a very interesting talk on the political problems presently blocking an effective "International Control of the Atomic Bomb." Mr. Morris Roe of the Oronite Chemical Company, who attended the September meeting of the directors of the Chemical Corps Association for the San Francisco Chapter, reported on that meeting.

Mr. W. P. Fuller Brawner (Colonel, Chemical Reserve) acted as master of ceremonies, introducing to the group Col. J. W. Lyon, former Commanding Officer of the San Francisco Chemical Procurement District, and Col. C. M. Kellogg, Chemical Officer of the 6th Army, who both spoke briefly, the latter on the local "composite group" of Chemical Reserve officers.

The meeting continued all officers and directors in their present positions.—PHILIP J. FITZGERALD.

WASHINGTON CHAPTER

"And a good time was had by all" is a prosaic expression, but it applies 100 percent to the 150 members and guests who attended the social gathering of the Washington Chapter on 18 October.

The program consisted of a buffet supper, technicolor movies of the atom bombing test at Bikini, and the Byrd Expedition, and dancing. Miss Ruth Anderson and Miss Hannah Pittleman lent charm to the program with several piano renditions.

The one-man band (who pantomimed to recordings) provided much entertainment, and provoked many a giggle from the girls in the back row.

A recent membership drive in the Office, Chief, Chemical Corps, resulted in a gain of 20. This is a step in the right direction towards attaining the goal of 100 percent.

Maj. Osmund Varela, an active member of this chapter, has been hospitalized at Walter Reed for several weeks. We wish him a speedy recovery.

CLEVELAND CHAPTER

The Cleveland Chapter held a meeting on Friday evening, December 5, in the Cleveland Engineers Club.

This being the last meeting of the year, we had our annual election of officers, the following being elected:

O. O. Kenworthy, president; G. C. Unkefer, 1st vice president; Ralph Keller, 2nd vice president; D. J. Connelly, secretary-treasurer; J. E. Underwood and H. L. Ebert, directors.

We were quite fortunate in having one of the most outstanding speakers we have had this year in Col. John R. Wood, Chief, Medical Division, Chemical Corps Association. His subject was "Chemical Warfare Research's Contribution to Clinical Medicine."

D. J. CONNELLY,
Sec'y-Treasurer

DUPONT GETS GERMAN COMPRESSOR

A vertical two-stage gas compressor built by Machinernfabric, Esslurgen, Germany, and placed on display at the Army Chemical Center, Maryland, during the 1947 Chemical Corps show has recently been transferred to E. I. du Pont de Nemours & Co., Inc., Bell Works, Bell, W. Va. Although this compressor was originally designed for nitrogen compression at 3,000 to 4,000 atmospheres, it was used in the Lupolin H plant at Anorgana G.m.b.H., Werke Gendorf as a single-stage compressor for the compressing of ethylene to about 1,500 atmospheres. Upon receipt from Germany, the compressor was originally assembled by personnel of the Plants Division, Chemical Corps Technical Command, Army Chemical Center, Maryland.

Your Chapter Officers

The Journal has requested chapter officers of the Association to send in pictures and brief biographical sketches for publication in this department. The first series follows:

WALTER T. HARPER, JR.
President, Huntsville Chapter

Born in Birmingham, Ala., 16 May 1914.

Educated in Birmingham public schools.

Attended Howard College, Birmingham, Ala., and Stephens Institute of Technology, Hoboken, N. J. B.S. degree from Howard College.

Prior to World War II was Assistant Plant Superintendent, Swann & Co., Birmingham, Ala.; Technical Director, Manganese Corp., Anniston, Ala.; associated with the F. W. Burk Co., New York, N. Y.

Entered active duty with Chemical Warfare Service 27 February 1942. Served at Edgewood Arsenal and Huntsville Arsenal. Released from active duty 25 October 1946 in the grade of Major at Huntsville Arsenal. Served as Safety Director and Executive Officer.

Employed by the Chemical Corps as Chemical Engineer, Huntsville Arsenal, for six months following release from active duty.

At present General Manager of Bryant-Harper Co., Inc., Huntsville, Ala.—chemical manufacture, chemical sales and contract processing.

LT. COL. ELLIOTT MORRILL
President, Chicago Chapter

Born in Melrose, Mass., 2 November 1905.

Educated at Lombard College and the University of Chicago.

Business: Vice President in Charge of Research and Development, Rit Products Corp., Chicago, Ill.

Residence: 218 S. Elmwood Ave., Oak Park, Ill.

Married Juanita M. McGrew in 1928. One son, John E. Morrill, born in 1935.

Member of American Chemical Society, American Association of Textile Chemists and Colorists, American Association for the Advancement of Science, Society of American Military Engineers, Reserve Officers Association, Chemical Corps Association.

Military History: Appointed Second Lieutenant, Chemical Warfare Reserve, August 26, 1930. Reserve training with 304th Chemical Regiment. Entered on active duty January 6, 1941, as Captain, CW-Res. Promoted to Major AUS Feb. 1, 1942, and Lieutenant Colonel May 1,

1944. Active duty during World War II with Chicago Chemical Warfare Procurement District, and Inspection Office, up to October 1, 1944. Served as Chief, Planning Division, Office of Air Chemical Officer, Headquarters, Army Air Forces, Washington, D. C., until relieved from active duty on 31 January 1946. Commissioned Lieutenant Colonel, AIR-Reserve, September 25, 1945.

President, Chicago Chapter, Chemical Corps Association, April 1, 1946.

PAUL BAUMAN
President, Baltimore Chapter

Born in Catonsville, Md., in 1902. Graduated from Catonsville High School June 1918 and left the next morning for Gunpowder Reservation (later renamed Edgewood Arsenal) to take a position as Government Field Clerk. This was during the First World War when Cg, C1 and MO was made in the laboratory, when individual protection meant climbing a ladder on the side of the barracks and remaining on the roof until "all clear" was given, when CWS was known as "crowbars, wheelbarrows and shovels." Remained at Edgewood until latter part of 1919 when he felt the urge to go "west." Followed oil field work in Oklahoma, worked as cowhand and farmhand on ranches in Missouri, Oklahoma and Kansas and finally started in the automobile

business in Tulsa. Returned to Catonsville in 1924, continuing in auto business. Studied accounting at Baltimore College of Commerce, Johns Hopkins and International Accountants Society. Joined accounting staff of Baltimore News-American, a Hearst newspaper, in 1927, where he is still employed as Purchasing Agent and Assistant Chief Accountant. Married in 1930, has two children, Bob, 12, and Bette, 9. Pearl Harbor Sunday volunteered for civilian defense, appointed precinct warden, assisted in organization of county defense. Enlisted as private in Maryland State Guard early part of 1942 in Chemical Warfare Section, rose in rank and was commissioned Second Lieutenant, May 1943, 1st Lieutenant January 1944, assigned CO, Chemical Section, with duties, instructing Civilian Defense, instructing soldiers of State Guard throughout state, conducting Chemical Schools at summer encampments. Promoted to Captain in December, 1945, assigned, General Staff, Assistant S-3. Honorably discharged, February 28, 1947. At present active in Cub Scouting program, Cubmaster of Pack No. 399, Catonsville, Assistant in Scout Troop 307, assisting in organizing other Packs. In fact, whole family is active in Scouting. Mrs. Bauman is Brownie leader, Bette is a Brownie. Bob recently graduated from Cubbing into Scouting and is up for Second Class. Active in community affairs, serving on various committees, notably mission of which is to establish an Armory and National Guard Unit in Catonsville.

BUREAU OF MISSING PERSONS

National Headquarters does not have the correct addresses of the members listed below. Please advise this office immediately if you know their address.

Lt. Clyde L. Friar
Maj. James Watson
Mr. Clayton N. Ingle
Col. Raymond C. Kinne
Mr. Joe Pelliene
Mr. A. Shipley
Lt. Col. Lester Berry

GEN. CLARK PRAISES HOOKER FOR INDUSTRY-ARMY DAY

Colonel Albert H. Hooker
Tacoma, Washington

DEAR AL:

It was a pleasure for me at the dinner at Fort Lewis on Industry-Army Day to pay tribute to you for spark-plugging that important event. In addition, I want to again tell you, for the record, that you did an outstandingly good job welding the many Reserve Associations together and joining with industry and the military in an event that will be of great value to our country.

Your energy, intelligence, and great ability for organization were all exhibited personally on that important occasion. Please accept my thanks for a duty superbly performed.

Sincerely yours,

MARK W. CLARK
General, USA
Commanding 6th Army

MEDAL OF FREEDOM AWARDED TO ROB KINGAN

Mr. R. Kingan, British civilian, was presented with the Medal of Freedom with Bronze Palm in ceremonies by Maj. Gen. Alden H. Waitt, Chief, Chemical Corps, on 15 December 1947.

As representative of the British Central Scientific Office in Washington from 1942 to October 1945, Mr. Kingan was a key figure in the exchange of chemical warfare information between American and British agencies. Specifically, he contributed greatly toward standardizing colors of smoke munitions, standardizing bomb cases, and developing the mechanical smoke generator. His outstanding ability led to elimination of much duplication of effort and effected extensive savings on the part of British and American establishments.

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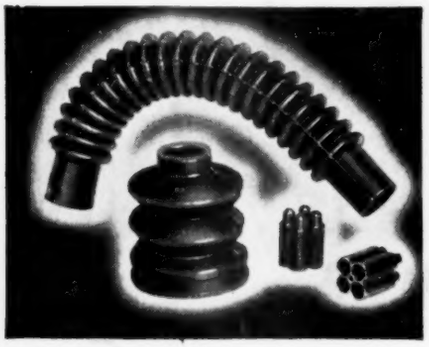

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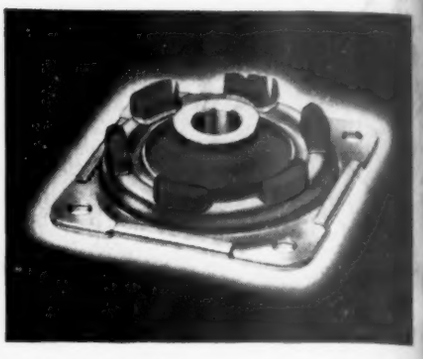

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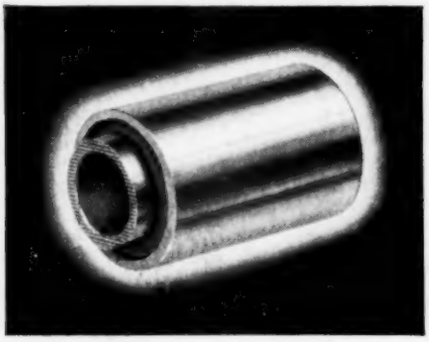
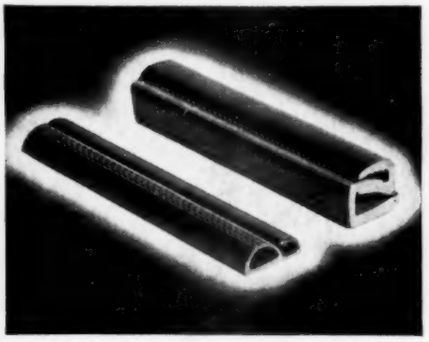


SILENTBLOC BEARINGS for oscillating equipment—need no lubrication, work silently, long lasting, unharmed by dust or liquid.



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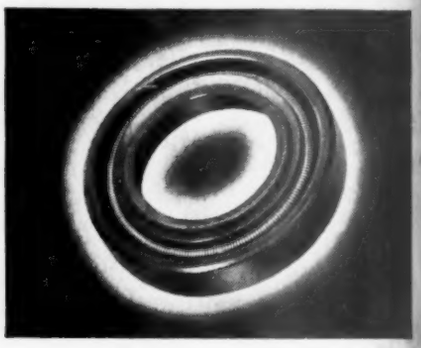

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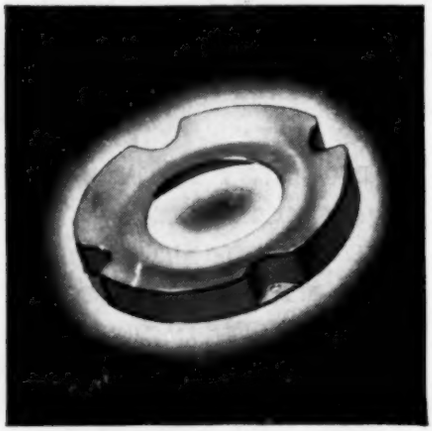

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SHOWN HERE are exploded and assembled views of ROTOL gearbox drive. On many parts, tolerance was held to ten-thousandths.

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